COAL AGE

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MANY times we have been told what essentials are necessary in the character and general training of a mine foreman. One important requisite, usually overlooked and without which he cannot be a success, is ability to form a correct opinion of the fitness of each applicant who seeks employment in his mine.

When questioned on this point the average foreman is quick to reply that "when times are prosperous and the demand for coal is great, the operator is so urgent in his request for increased tonnage that there is no opportunity for the exercise of discretion in the selection of men."

At first glance the policy of "hiring any old thing" might seem compulsory on the part of the foreman, but such a course is *dead wrong*, and that man is fortunate who "gets fired" because of his refusal to cooperate in the criminal plan of a greedy corporation.

New York City has its professional man-killers, who, for a few dollars, will contract to furnish cause for a pleasing obituary of a dear friend; but these demons of the underworld are honest angels with snow-white wings compared to a fellow who will send an ignorant, inexperienced, two-legged human into the confined recesses of Mother Earth to deal out death to a hundred innocent, unsuspecting, toiling men.

"Gyp the Blood" and his pals never posed as deacons in a Christian church; their business was commercialized crime of the most violent order, and among their associates there was no pretense as to their means of livelihood. That's why they are less undesirable as citizens than coal-mine foremen who are willing to prostitute their manhood by assenting to a plan of action in direct violation of just and moderate laws.

And concerning those mine owners who are responsible for a condition which not only permits, but attempts to force the employment of what may properly be termed "illegal labor," the less said, the less will be the jar to the delicate sensibilities of timorous readers. In all businesses, there are a *few* people who gain wealth and power by treading on the hearts and commercializing the hopes of less-fortunate brethren.

The fellow who grows rich selling cocaine to weaklings and degenerates argues that the world owes him a living, and that somebody else would supply them if he didn't. The coal operator who orders or consents to the employment of inexperienced men as MINERS (no reference to laborers), pleads "self defense" and contends that his nearest competitor would hire the same men and profit at his expense. There isn't any difference in the degree of guilt of the two lawbreakers, and those states that flirt with one and pursue the other lack both intelligence and honor.

Any mine foreman in the employ of a company whose slogan is "coal at any cost" would do well to shift his allegiance to some concern whose business conduct is in accord with the motto, "Safety the first consideration." It is comparatively easy to direct a well-drilled and efficient army, but practically impossible to preserve your identity and gain glory in the leadership of a mob. A boss is certainly not a boss when he is denied the common privilege of exercising his own personal judgment in the selection of company employees.

In conclusion, remember that in this day of organized labor it is easier to hire a man than to fire him. Also recollect that any individual who engages himself as a mine foreman assumes responsibilities so grave that they can be measured only in a scale of human lives.

Ignoring all the moral and humane phases of the question, and viewing the proposition solely from a standpoint of ultimate gain to the mine owner, it must be plain even to the dullest mind, that—*any corporation whose only requirement for eligibility to employment as a MINER is freedom from physical paralysis is above par as an economic blunder.* Mine laws should either be enforced or repealed.

Ideas and Suggestions

Interesting Talks Submitted in Response to Our Recent Request for Forewords.

Co-operation at Coal Mines

BY PENNSYLVANIA CORRESPONDENT

In coal mining, as in any other business, coöperation is imperative. The stockholders and their directors must work together with the manager of the company, and the superintendent must coöperate faithfully with the manager on the one hand and with his foreman on the other. Intelligent foremen will help their assistants in carrying out the orders of the superintendent, and assistant foremen must coöperate with their firebosses. And, finally, assistant foremen and firebosses must work in harmony with the miners to recover the greatest possible tonnage at the least cost consistent with safety.

When a spirit of helpfulness permeates the entire organization, the best results are obtained You may work with a man willingly or doggedly. You may assist him because of his good nature, or your own. Or, you may be called upon to render a service, and merely do it indifferently. Your real reason, however, should be an earnest desire to do unto others as you would have them do unto you.

Underground, wherever two or more men work together, there exists not only the opportunity, but the necessity for cooperation. Mining, like other occupations in which the use of great physical and mechanical energy is necessary, is attended with its own particular dangers. The chance in coal mining which this offers for mutual helpfulness in preventing accidents is perhaps greater than in any other calling. In this connection it is well to remember that a large part of the mining law has been enacted to safeguard the lives of the miners, and it is, therefore, only reasonable that all whom the law aims to protect should cooperate in the enforcement of that law.

There always exists a certain amount of rivalry between section bosses in a mine. Each boss is anxious that his section show the maximum production at the least cost, that his roads be the cleanest in the colliery and that his miners post their places properly. In fact, he is anxious to make his the best all-around section in the mine. There is no reason that this spirit should ever bring about unfriendly feeling, and the mine foreman should see that it does not. On the other hand, friendly rivalry between section bosses should be encouraged as promoting, not only the efficiency of the colliery, but of the bosses themselves. In a fair contest, a man will do his best for the keen joy of it. This sort of rivalry, then, is the best kind of coöperation.

Where two or more bosses have greater or less authority over the same men, as for instance, the motor boss and the section boss over motormen, there must needs be coöperation between them, in order to eliminate, as far as possible, all contradiction of orders. A man subjected to constantly changed orders is soon disheartened and his efficiency greatly lowered.

All men who hold papers as firebosses, assistant foremen, or foremen, are constantly in a position to coöperate with ambitious men under them. Men looking forward to trying the state examination ask many questions, which it is well for the more experienced to carefully answer. By teaching, one learns, and therefore, a boss who answers inquiries is benefitting both the questioner and himself.

From first to last, coöperation in the mine is an absolute necessity. The miner who succeeds is he who can coöperate with his neighbor; the successful mine is one in which all employees and all departments are coöperating.

A Mutual Improvement Class

By John Vincent*

A class of this kind is possible in every mining town and camp. Why not have it? It has been largely adopted in Great Britain and in some of the mining camps of British Columbia, Can. In Scotland the Institution of Mining Students serves the purpose. Papers are prepared and read by members of the institution on all subjects concerning mining.

This latter institute is composed almost entirely of workingmen, and everyone is invited to give a paper; sometimes two and three are read at one meeting. Discussions then take place, and this affords good practice.

Such talks give a man an opportunity to explain his views properly. He needs practice, and the bashful and nervous man soon gains more confidence in himself.

At the close of every meeting, the subject for the next meeting is announced, and the men have an opportunity for a little preparation. This also is a great help to the student, for to be able to debate he must study the subject.

At Middlesboro, B. C., a class of this kind was organized by the superintendent of the mines. The attendance was large, and, in the words of the chief inspector of mines for British Columbia, who attended one of the meetings, it was most interesting, and he hoped that more of these classes would be formed throughout the mining districts.

It is up to the superintendent, foreman and fireboss to see that this kind of a class is started in their town or camp. It serves to employ the leisure time of the men, when they might be wasting it in some foolish pastimes. When the class is properly organized, it might be well to visit, if possible, other collieries, iron works, etc. Photographs could be taken by some enterprising member and converted into lantern slides.

In starting this class, it is best to have all the subjects as practical as possible. The average miner has a chance, then, of joining in the discussion. If the meeting is conducted properly, the chairman will see that one or two men do not do all the talking.

The reading of the first papers could be done by someone a little advanced in mining. Others could then be solicited by members of the committee, so that at least one or two papers could be read at each meeting. Many of those who are members of the class at Middlesboro, B. C., are subscribers to COAL AGE and other mining papers. These journals are found to be a great help to those who join in the discussion; in fact, some of the articles and letters in COAL AGE were again discussed at the class meeting.

Well, then, readers of COAL AGE, it is up to you to start a class of this kind in your own district. It will prevent the men wasting precious hours in idle folly.

*Field, B. C., Canada.

Carpet Bagging: Its Effect on Mining

By Sim C. Reynolds*

The average miner is one of the greatest of paradoxes, and he retains the right to that title clear up through the ranks to the general manager. He is a natural-born optimist, and at the same time an inherent pessimist. The future to the collier usually appears as of a roseate hue, but he is content to draw the present in a grayish-brown shade, and he orates on it in a manner which easily gives him the lead of all workmen as the champion grumbler.

He will stop work on the slightest provocation, gather up his kit of tools and "mosey" off to another mine, where he will tell you, if you stop him to inquire, that the coal is thicker, the draw-slate thinner, the weight better, and there is steadier work, albeit he is even now getting as much work as he cares to do.

And this trade, is made when, as a matter of fact, the conditions at the mine to which he is bound are as like those which he is leaving as two peas in the same pod. Yet he will start off with a cheer which is heartening to behold, unless, indeed, you happen just then to be desperately short of men and far behind with your contracts. Then his gleeful anticipation becomes positively painful.

We are all acquainted with that story regarding the miner's chickens. They had become so accustomed to their owner's wandering propensity that they would invariably lie on their backs and set up their feet for tying whenever a wagon came rumbling down the road. Of course, this statement misses the mark somewhat, but not by more than a mile.

For the "wanderlust" seems to be an inherited part of the collier and the occasional desire for a change of working place to be characteristic of the members of the craft generally, since the industry first began. These restless wanderings and sundry confinings of poultry by temporary bonds are due to the labor of coal mining not being exactly equal at any two mines. And, for that matter, where tonnage is the basis of payment, there are hardly ever two places in the same mine productive of the same amount of pay for a given output of labor.

Of course, there are a few men, subordinate and official, who are exceptions to the rule here elaborated, but they only make the restlessness of the others more glaringly apparent. I have known men who have grown old in the service of one and the same mining corporation. Yet it is as true and for many reasons, regrettable, that the great majority of miners and officials grow old or die young, in or about mines, far removed from those in which they made their advent into the work.

The aimless drift from employer to employer has a direct bearing on the general safety of a dangerous mine, and on the good discipline of any colliery. As such it should be emphatically discouraged.

An example is wholesome and far-reaching, which extends from headquarters down, rather than from the loader up. This plea for a continuous mine management is necessary because the traveling trait is quite as noticeable in the supervising force as in those they employ, and quite as naturally so, since they are all miners still, regardless of the title time, experience and education have given them.

Changes Occasionally Justified

Of course, frequent moving from the employ of one firm to that of another is sometimes warranted because of the irregularity of mine operation. Men cannot well remain at a mine during the long period of summer idleness if it is operated to all intents and purposes only during the winter months. Nor can they be expected to stay during the winter months at mines which work steadily only while the lakes are navigable.

Movements from such mines are legitimate, and are not in the category, to which I have referred. The irregularities in operation are seemingly impossible to avoid, and the shiftings from place to place are not less inevitable, but the other "floating" can give no excuse. We need a greater tolerance, an earnest effort to understand the other fellow, to try and see things from his point of view, to seek out the motives causing this to be done and that to be left undone, before passing summary judgment which will mean a change in the force. A more general attempt to size aright the human characteristics of the working force will tend to break up what is now, and will continue to be, an injurious habit.

One of the obvious disadvantages resultant on this pernicious phase of mining life, insofar as the miner himself is concerned, is the feeling of irresponsibility created. There is generated a feeling of independent action which too often results in an excessive sense of liberty. A miner often takes license to do just as he pleases, regardless of the effect it may have on the safety of the mine.

He and those of his companions having the same spirit cleave very close to the line of lawlessness, combatting the efforts of the mine foreman or firebosses to maintain such discipline as is essential to carrying out the rules governing the mine. Such spirits in any industry soon break up the needed restraint of the personnel.

In ours, the effect of such license is the more deadly, and there is more reason therefore for its restraint because it sets a bad example and may possibly result in injury or death to others. Between this and the true spirit of independent action, which we hope never to see die in the hearts of miners, or mine managers, there is a line which must be strictly drawn if it be drawn at all: a line across which none may trespass if the best interests of all of us are to be conserved.

In my own experience, I have suffered long months of semi-poverty, and ostracism among the mine managers of the coal region in which I lived, when mine-foremen have arbitrarily crossed this line. In turn I have taken part (albeit more or less unwillingly) in obliterating the same divisional mark when I was a miner.

Nowadays, in a clear perspective, I can recall many strikes in which I took part, being in sympathy either with or against the majority, which were just as unnecessary as those which as frequently arose from the revengeful judgment of the men who were temporarily my superiors. I have seen the miner collective and the individual collier alike, take advantage of the power behind him to ride rough shod over rules which were formulated as often for his benefit as for the advantage of the corporation for which he worked.

Such aggressive actions of miners and managers are equally senseless, and bring their own punishment in due time. Men are not constituted to forget easily the arrogance of others, and as a result of some previous action on the part of manager or foreman, discipline is cast aside, sometimes at that crucial moment when it is most needed, and the officials (and quite often those not directly at fault) are compelled to accept an obnoxious ultimatum.

It is estimated that every 8 to 12 tons of coal mined in this country require the use of one chamber prop. The average cost of props is from 10 to 20c. each, so the cost of timbering per ton mined is 1 or 2c. The use of cement props in mines where they could be withdrawn would lower the cost of timbering as well as conserve the waning timber supply.

*Mine Inspector, W. J. Rainey Co., Mt. Braddock, Penn.

Quick Action on Payrolls

By John C. McNeil*

Semi-monthly paydays are always preceded by several nights of drudgery. The mine accountant labors late to close his miners' ledgers, make up payrolls, get out statements, prepare his change lists, and get ready to pay the miners. A system which will eliminate any of these steps will help to give the accountant a rest and make his work a pleasure.

A Form to Serve Four Purposes

The accompanying form will serve as a miner's ledger, employee's statement, receipt for services and check in payment of same and it can be made out daily. The form should be 8½x10 in., with a 1½ in. margin for binding purposes. This margin should be perforated for tearing, making the entry sheet 8½x8½ in.

At the beginning of the period, the mine accountant should make out a sheet for each employee. Each day the number of tons, hours or yardage and rate should be entered under "Earnings" in the proper columns. If preferred, these items can be made cumulative so that they will show at a glance the employee's earnings up to date.

The deductions can be made in the same manner and if so desired the net balance due the employee can be carried out each day. Immediately after the close of the period, the earnings and deductions should be totaled and carried out into the summary statement at the right of the form and the balance struck. The usual entries should then be made on a payroll and each employee's sheet should be initialed by the clerk entering same as having been examined and entered.

The Necessary Verification

They should then be passed to the mine accountant who should verify the calculations and extensions and if correct should sign them as evidence of his investigation. The mine Superintendent should approve each sheet to indicate that the employee actually rendered the services stated. The payrolls and ledger-voucher sheets properly signed should then be passed to the auditor or head of the accounting department for audit.

A place should be shown on the payroll for the audit number, moreover the month in which the services were performed, together with the audit numbers should be inserted in the upper right-hand corner by the auditor or head of the accounting department and the voucher sheet signed by him as having been audited. The sheets can then be passed to the treasurer or final approving officer for signature.

*Artemus, Ky.

The ledger sheet then becomes a statement to the employee for services rendered the company and upon his signing the receipt at the lower right-hand corner of the voucher, becomes a check payable at the company's depository. After being receipted by the employee the voucher will become negotiable and will pass by endorsement the same as any other check.

At the time the payroll is made out, the mine accountant can prepare a distribution of the time or money in accordance with the desires of the accounting department and the payrolls together with the distribution and statement-vouchers passed to the proper officers not later than the second day after the close of the period. A form should be furnished the bank for listing all canceled checks when returned so that its payments can be duly credited and a column provided for the disbursement number of each check.

The Voucher System

This disbursement number should be entered on the check and also on the payroll in a disbursement-number column and the check filed along with other canceled checks. The net amount of the payrolls will, of course, be credited to "Payrolls Payable" from the payroll journal entry and the amount of these checks charged to this account from the bank's report and the net amount of this account will always represent the amounts due the employees.

The advantage of this system is that you get an absolute receipt on the original entry sheets from the employee, guaranteed by the bank. It eliminates the rendering of statements to the employees before paydays and the banks will be glad to handle the business in this way because of the inducement it holds out to the miners to save their funds.

The checks can be passed to the employees without any loss of time to pay them off. Where there are no banking facilities, the mine accountant can pay the checks off in cash and it will still eliminate the extra time spent in taking off statements, and will enable the books for the period, to be closed in two or three days after its close.

ANY COAL COMPANY Anyplace,.....19....

To.....Dr
For Services rendered this Company in various capacities at.....
.....Mine for the period..... 191...
to.....191.., inclusive, per detailed earnings and deductions shown below.

Number
Month
Year

Working No.
Entered on Payroll
Sheet No.
Line No.

Dates		EARNINGS						DEDUCTIONS				STATEMENT
		Ton	Hr.	Yd.	Rate	Am't	Misc.	Total	Scrip.	Misc.	Total	Bal.	Earnings:
1	17												Bal. Brt. Ford..
2	18												Tons @.....
3	19												Tons @.....
4	20												Tons @.....
5	21												Hr. @.....
6	22												Hr. @.....
7	23												Hr. @.....
8	24												Yd. @.....
9	25												Yd. @.....
10	25												Salary.....
11	26												Transfer.....
12	28												Total.....
13	29												Deductions:
14	30												Scrip.....
15	31												Explosives...
16	xx												Rent.....
													Medical.....
													Insurance....
													Taxes.....
													Dues.....
													Miscellaneous
													Total.....
Total													Bal. due Employee....
													Bal. due Company....
													Examined and Entered: Clerk.

.....Perforated line.....

When approved for payment by the Treasurer and when receipt below is signed by payee above, the ANY BANKING COMPANY of ANYPLACE, will pay this pay voucher upon presentation.

Correct
.....Accountant.
Approved
.....Sup't
Audited:
.....Auditor

Approved for Payment:
.....
Treasurer.

Received.....191..of ANY COAL COMPANY, $.....
.....Dollars, in full settlement of the above statement of services rendered from
.....191.., to.....191..
in all capacities.
.....
Payee
Witness.....

The amount of binder necessary to make a successful briquet depends upon the density of the dry coal and its rate of absorption. Coal with a density of 1.4 calls for the use of 6 per cent. of pitch binder. Coal with a density of 1.1 takes 7.63 per cent. of pitch.

Coal Mining in the New Bosnia

By Felix J. Koch*

The coal industry has been made possible in Bosnia by the complete removal of the Turkish yoke with its petty peculations. The coal is in places 16 ft. thick and is prepared in 5 sizes for the market. When the demand is slack the coal is piled inside till wanted. Fifty-two cents a day is an average earning for an adult. No women or boys are employed.

*Hearne Ave., Avondale, Cincinnati, Ohio.

The southeastern corner of Europe is hardly to be regarded as a great coal territory, but here and there, mining has been carried on with large profit to those who have engaged in it.

The diplomatic action of 1910 gave Austria-Hungary an absolutely clear hand in Bosnia, and assured her a real ownership of the province in place of a possession which up to that time had been merely nominal. Since then the capitalists of more northern and central Europe have been better disposed to come down into the Austrian Balkans and invest, so that now the long-neglected land is rapidly developing.

Change of Masters Put Bosnia on the Map

Although the mining systems are still rather primitive, when compared with American methods yet the progress of the province is surprising to the Bosnians accustomed as they have been to see their mineral riches continue unexploited. The little province was nominally still part and parcel of the Ottoman Empire up to 1910, but was occupied by the Austro-Hungarians as far back as the Treaty of Berlin.

Three decades ago, to have entered Bosnia without military protection would have been foolhardy. It was known that beds of coal existed in that country; just as, today, we know that in northern Turkey coal is to be found. Nevertheless it was practically impossible to exploit the deposits. For one reason or another the government obstructed their development, and the promoters gave up in disgust.

Turkish Graft

After prospecting and buying tips from the Christian peasants, the prospector applies direct to Constantinople for a writ or imperial *firman,* giving him permission to dig. This is necessary because of a delightful fiction, whereby coal and ore are regarded as the Sultan's personal property, no matter upon whose land they may be.

Armed with this, the prospector and his men return to the region. In all probability it is a lone, out-of-the-way mountain glen, dozens of miles from a "city," or as we would term it a village. Here he exhibits his firman to the reigning district governor or pasha.

The pasha is a petty autocrat, who has absolute power of life and death over his subjects just so long as he basks in the favor of the provincial governor or vali, who, in turn, is absolute as long as the Sultan permits. The pasha, moreover, has to look to "No. 1" in this dealing.

The Blessings of Christianity and Coal Mining

He is appointed to his post, but he virtually buys the office, That is to say, he pledges himself to turn over to the imperial treasury so many thousands of "medjidies" annually. This sum is supposed to be derived from taxes, but what is not obtained in this manner is collected by extortions from the Christians and from such exploiters as would work up the natural resources of the district.

The beginning of a mining boom would be an incalculable bonanza to the Turkish pasha under whose control it might be established. The pasha, however, does not operate directly. Taxes are farmed out in the Turkish Empire to publicans, each in turn, paying the pasha so much a year to permit him to extract his "squeeze."

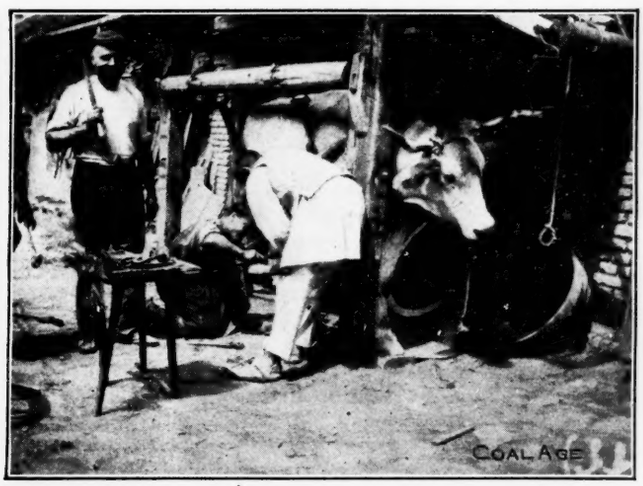
When, now, it reaches the pasha's ears, (and owing to the sublime system of espionage everything does reach the ears of the attentive pasha) that a mining enterprise will be started in the district, he summons the publican, whose duty is to afflict the people of that district, and tells him just how much he must contribute. The publican's manifest duty is to extort the money demanded from the new mining company.

The "Touch" a la Turque

Here, then, enters the chicanery that makes Turkish methods so despicable. They can best be exemplified by an anecdote told me at Plevlje, the capital of Sandchak, quite recently. A large number of Roman remains had been discovered in a remote casa, or section, of the district, and some antiquarians obtained from the Sultan permission to take these out.

Arrived at the place, the kaimakan, or local official, expected his "loot" for the exploitation. This the scientists refused to pay, for principle's sake. As a result, he demanded to see the Sultan's writ. It was produced, a great parchment covered

A Bosnian Mine Car Embodying All Known Faults of Construction



The Motive Power of Banjaluka Mine Being Shod in a Shoeing Stall

with Arabic figures, and at the top the pyramidal monogram of Abdul Hamid.

The paper, like most Mosleum documents, was capable of very varied construction. As a result, it was found that the document expressly said that the find might be "taken out" of the ground of the said casa of Blank. Nothing, however, appeared about taking the treasures away from the place where they were found.

Incredible as it may seem, the kaimakan insisted on this technicality. To reapply to Constantinople would be costly; for the pressure would all have to be brought to bear over again, and so the pasha was "satisfied." Then and there the law, too, was "satisfied," and the very broadest construction of the document was permitted after that.

The Austrian Bosnia

It is in the face of these difficulties that men turn away from the exploiting of the mineral wealth of European Turkey.

Bosnia, up to the time of the occupation, was in the same status, if not worse. Today, however, a visit to a Bosnic coal mine, such as the one at Banjaluka, shown in the photographs, is an exhibition of most remarkable progress, in the light of past history.

The mine in question was opened up in 1881, or coincidental with the assumption of real authority over the country by Austria. On an average 35 miners are employed; the number increasing in the winter, both on account of the demand for coal, and also because the peasants then have nothing else to do and are only too glad to earn a few additional kronen.

The Day's Labor and its Wage

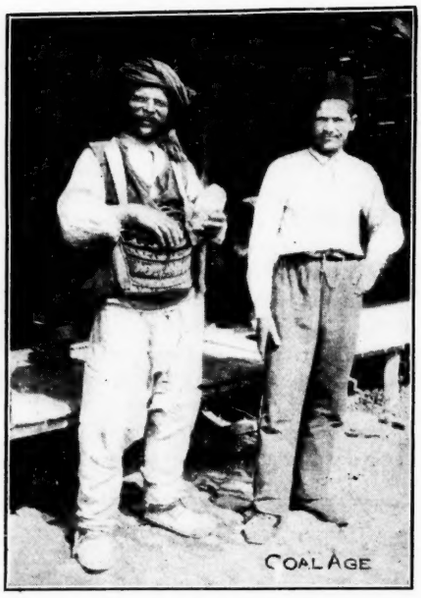
Eleven hours a day is a working shift —an hour being given for the midday rest so that the mining hours are roughly from six to six. Most of the miners are married men, working in the fields on alternate days or weeks with their wives, and so conducting both farm and mine successfully.

Women and children are not employed in the mine; and hence wages are almost uniform throughout. These range from 18c. a meter centner[1] (for the metric system is employed throughout) on one variety of coal extracted, to 12c. for nut-coal and 5 to 8c. for slack.

Boys over 16 are allowed to work in the mines, though for outdoor labor the law sets the child-limit at 14. Many of these earn not only pocket-money, but the largest part of their support at this labor.

A Guide de Luxe

Our tour of the Banjaluka mine was interesting. For guide to the village we had a young man of about twenty, who had heard the rumor (rumors spread like wind in the Balkan towns) that an American had come to town, and so came to call. Speaking German he proved a valuable auxiliary, and we made friends. Then he begged to be excused for a few moments, and when he reappeared we saw he was arrayed in an ill-fitting dress-suit, which he had put on to do us proper honor.



Typical Bosnian Miners, One Wearing the Turkish Fez

Obviously, then, when we came to the coal mine, he dared not enter for fear of soiling his suit of state, and not quite knowing how to excuse himself his perturbation was amusing to witness. Finally he cut the Gordian knot by introducing us to the director, an Austrian, who furnished a regular miner to show us through.

Fourteen Mine Wagons Every Day!

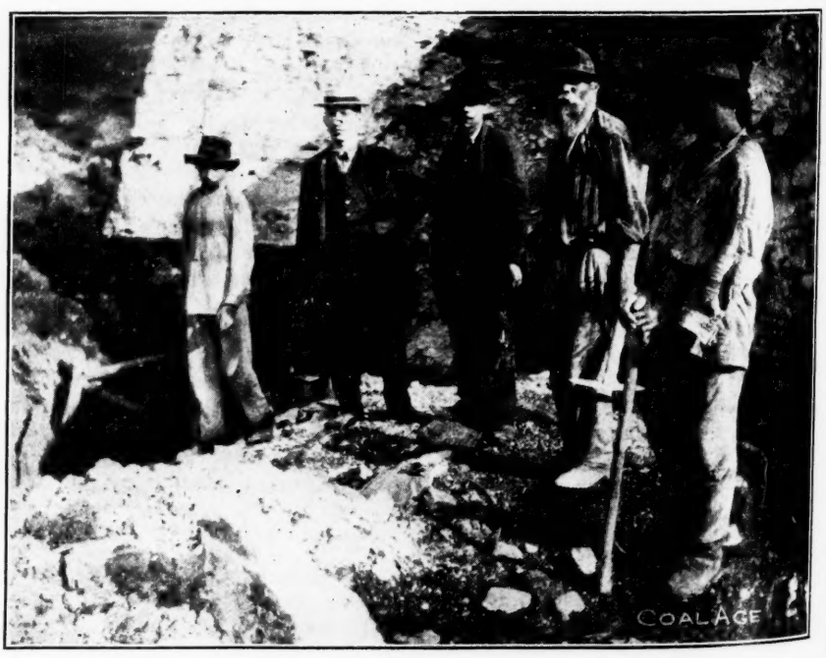
A barren hill-side, on which the grass had parched beneath the August oriental sun, with the entry to the mine at its base; a little branch off the military narrow gage road, a good sized tipple, and the mine was before us. Fourteen carloads,—five different varieties—our guide proudly informed us, came out of that little entry every day.

It was half-past two when we went in, and the draught at the door was delicious. A moment later and we were in Egyptian darkness. A little urn-lantern at the end of a rod, such as one sees among the ruins of Pompeii, at the National Museum at Naples, was furnished us and the descent began.

We were in a gallery, high enough to permit of standing erect, with coal above and at either side, and the floor composed of a plank laid between the two rails of the mine track. Here and there we could see the supporting wooden-beams, now so soft that the hook of the lantern could be stuck into them, as into a loaf of bread, and all covered with an exquisite white fungus. .

The Interior of the Mine

Again, too, in places, it became wet in this gallery, and it grew so cool that we could see our breath. Here and there we were shown where the thick black stratum of coal disappeared below the floor or rose above the roof. Over the coal, the white "mussel" or shell, a peculiar limestone coral, forming a great band of white set directly against the jet black coal, in a manner that made the latter



An Open Cut to the Banjaluka Coal Mines, Bosnia, Austro-Hungary

[1]Meter centner 220.46 lb., or 0.09 short tons. Thus 18c. a meter centner is $2 a ton and 12c., $1.33.

seem as if it were painted on a snow bank. But this coral rock sometimes disappeared.

Ascending and descending, the silence, after months in the noisy, happy-go-lucky Balkans, became intense. Finally, from far ahead, grew mutterings in the musical Croatian or Serb, which is the language of the Turkish miner, as well as of the Christian in Bosnia. Though at most, these men will earn but fifty-two cents a day, they are ever happy-go-lucky.

After travelling 600 meters[2], we reached the lowest point in the mine.

How They Store Coal

Then we returned by other galleries. Occasionally a side heading would lead off, with massive chunks of shining coal piled against the wall. This is left here until called for, to prevent the loss this coal is said to undergo, both from light and air.

Then we came to more miners, in dirty trousers and shirts, each carrying the old-fashioned oil-lantern, or working by the light it shed from a friendly ledge. They thus plied their picks and shovels while

[2]1968 ft.

THE THICK COAL BED MAKES A HIGH DRIFT MOUTH NATURAL BUT NOT NECESSARILY ECONOMICAL

an assistant moved the little car where it might be filled the readier. The loads pull the empty cars up the inclines to the working places. At this point the bed was some five meters[3] thick, and the roof was well supported by posts.

There was a dynamite shed in the mine of which the guide was particularly proud. Looking up or down the shafts, beautiful, downy, white fungi could be seen hanging from the sides; while at other spots little mushroom-like colonies turned up their umbrellas. There were not a few rats and in a little stream which crossed the floor, albino minnows were plentiful.

Compensation For Accidents

The guide pointed out the place where one miner, one in a period of two decades, was killed by a great mass of falling coal. The company pensioned the widow until she re-married, and still provides for the support of the child.

All over Austro-Hungary, pension funds in which employee and employer coöperate are in operation. The amounts paid are small, but it is to be remembered that the average miner lives on corn, beans and home-made prune-brandy, with a bit of meat added only rarely on the Sabbath. So it will be seen that a little money suffices, if there is no work to create a hearty appetite.

[3]About 16½ ft.

Extending a Shaft from Below

By William Norton*

The shaft described was in daily use when extended and workings tributary to it had been driven in a bed of coal to which the shaft did not then extend. An upraise was constructed to within 15 ft. of the foot of the shaft, the "full-battery" system being adopted. A hole was drilled through the 15-ft. layer of rock and through this a rope was passed for hoisting the excavated material from an extension of the shaft which was driven down to a third bed below.

*Mining Engineer, Alden Coal Co., Alden Station, Penn.

Note—Paper read before Nanticoke Y. M. C. A. District Mining Institute.

In the anthracite region old shafts are often extended from higher to lower levels, but it is not such a common practice to drive a shaft up from a lower bed to within a few feet of the bottom of the old shaft and then sink a further extension until the work is all completed. This was the plan successfully attempted by the Alden Coal Co.

In 1893, the Alden Coal Co.'s No. 2 shaft was sunk from the surface to the Cooper bed, a depth of 616 ft. The dimensions of the shaft were 12 ft. by 34 ft. 8 in. This was divided into compartments as follows; an airway, 15 ft., two hoistways, 7 ft. 1½ in., and one pumpway, 3 ft. 5 in. wide.

The intermediate beds were developed from this shaft, and the Cooper bed was opened out from its foot. A rock tunnel was afterward driven from the Cooper to the Bennett, which was 120 ft. lower. The latter was worked from this tunnel and a slope driven down to the basin, which passed nearly underneath the shaft.

Alternative Plans

In 1908, the company decided to sink for the lower beds, but how to do this without interfering with the operations of the present workings was a difficult problem. To have sunk only during the night shift would certainly have been a slow and tedious operation, and one to which considerable danger would have attached.

The shaft was used throughout the whole day for hoisting coal, and nearly every night for letting down supplies, boards, rails, timber, etc. It can be readily seen that the plan to sink at night would not have been feasible.

After discussing different suggestions and eliminating all but the safest and most practical measures, the company decided upon one which would not interfere with their operations. They concluded to drive a heading back from the Bennett to a point directly underneath the shaft, and then to upraise an excavation from that point up to within 15 ft. from its foot. This 15 ft. was to be left in and made secure so as to protect the sinkers below, and also to keep the water from entering the new extension from the upper part of the shaft.

As soon as this part of the work was completed and timbered, the management purposed to drill a small hole through to the Cooper bed. Through this the hoisting rope could be passed. The sinking would then be resumed at the Bennett and continued down to the Red Ash bed.

The Survey

The first work to be done was to run an accurate survey. The corners of the shaft were located and calculated, but we found that owing to a bad mine fire around the foot of the shaft which had occurred in 1896, the timbers were so badly disturbed and out of square at that point that it was impossible to use them as a starting point.

The next best way was to plumb from the guides, about 100 ft. up the shaft. In this way the course and center line of the pit were calculated, and from this data, the corners were determined. The survey was then run and re-run from this foot to the point below in the Bennett bed from which the shaft was to start. This required a connecting line about a half mile long.

After the surveys were made to check, the corners of the shaft were established

at the starting place in the Bennett bed. These were made permanent by drilling holes into the ribs at the four corners and putting in iron pins, 1 in. in diameter and 3 ft. long, which could be put in place when it was desirable to plumb the shaft.

This was done at every cut, and the plugs were taken out before firing. Each corner had its own pin and each pin was marked with a center punch to show the exact corner. This was of the utmost importance in starting out, as an error, however slight, would have thrown the whole shaft out of true.

Upraising to the Cooper Bed

On Feb. 1, 1909, Francis Poole, the contractor, began operations. His men worked eight hours per shift, six men on each turn. In four months they had driven up about 100 ft., drawn out the rock, timbered the shaft, and in every way completed all which was then to be constructed above the level of the Bennett bed.

While upraising, the shaft was worked full of rock, but the rock was kept out of the corners of the shaft by placing 10-in. timbers, 8 ft. long diagonally at its four corners.

These timbers were placed 2½ ft. from center to center, and dogs were wedged on their lower sides so that they would not be knocked out by the rock which fell down the manways after firing. These also served the purpose of ladders for the men to climb up and down the shaft. The four corners being kept open served for the passage of the men and the coursing of air.

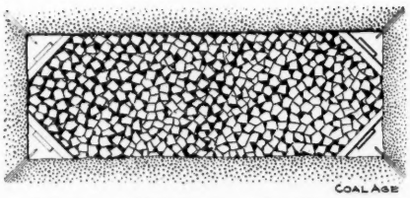
The latter was carried up one end of the shaft through the two triangular openings, and returned down the other end by way of the two opposite corners. The rock was kept in the shaft at such a height as to enable the men to reach the roof while drilling, and just enough rock was drawn out from time to time to keep the working level at this height.

Before every cut, the four corners were plumbed to the iron pins. Holes were then drilled in each of the corners and across the top. They were then charged, and all the tools were then let down the manway by means of a rope, before the holes were fired. The mine being gaseous, safety lamps had to be used and the work was somewhat slow.

Sinking to the Red Ash Bed

When the top of this portion of the shaft was reached, that is, when the contractor had excavated within 15 ft. of the Cooper, hitches, 18 in. deep, were cut into the sides and a battery of 12-in. oak and chestnut timbers were set skin to skin, and securely wedged, so as to make the top safe for the men working below.

The constant jarring of the cages on the bottom of the shaft tended to loosen



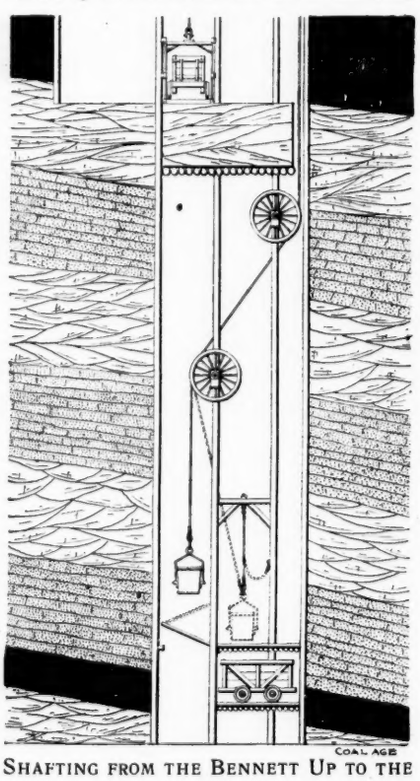
Showing Manner of Constructing, Ventilating and Plumbing Shaft

the rock and endanger the lives of those underneath. But the solid timbered roof just described removed danger from that source. After having completed this portion of the shaft, a small hole on its south end was driven through the 15-ft. barrier of rock; through this the sinking rope was passed.

A dump was then placed at the level of the Bennett bed similar to those used when sinking a shaft from the surface. The excavation then continued from the Bennett bed downward very much as it would, had the work been started from the surface. The lower part of the shaft was ventilated from the lower workings which were driven to the shaft for that purpose.

How the Excavated Material Was Handled

The hoisting was done with a pair of engines which were located on the outside. An 1⅛-in. Hazard Lang Lay wire rope with a hemp center was used for hoisting the material. This rope has the excellent quality of not spinning when the bucket is held in the steady. The rope was carried to the center of the hoistway at the north end of the shaft by



Shafting from the Bennett Up to the Cooper Seam and Down to the Red Ash

passing it over two 6-ft. sheave wheels placed in the upper part of the pit.

The dump was so arranged that by using a dead chain, the bucket emptied directly into the mine cars. Most of the rock was disposed of in the mines; being dumped down the pitching chambers, the rest was taken outside and dumped on the rock bank, for the inside facilities were not sufficient to keep the cars emptied.

The new portion of the shaft, 541 ft. deep, was completed on Sept. 1, 1910. On the following Saturday, the 15-ft. portion which was left in place was taken out from the Cooper workings, and the whole shaft connected, making a total depth of 1157 ft. The two portions of the shaft met exactly, without any error. The guides met in a line which was absolutely straight. No accident of any kind occurred during the whole operation.

Electric Mine Lamps

H. H. Hirsch, president of the Hirsch Electric Mine Lamp Co., sends us the following communication:

Will you kindly permit me sufficient space in your valuable journal to say a few words apropos of the recent awards of the Home Department of the British Government, for the best electric miner's lamp.

Of all the different types submitted, I know from good authority that there was only one outfit that not only filled every one of the necessary requirements, but had the advantage of having the lamp attached to the cap (adjustable to all angles); whereas, all the others had to be carried by the hand. The disadvantage of a hand lantern is so obvious that it seems incredible that prizes should have been awarded at all. No matter how excellent the outfit might be otherwise, the feature of carrying it in the hand should have been eliminated.

That an award was made carrying with it the implied endorsement of the British Government is altogether at total variance with their usual progressiveness and traditional practicability in mechanical appliances. I am heartily in favor of wholesome competition among the world's inventions, and commend the spirit and generosity of the colliery owner who gave the prize, but I am also anxious to see evolved an outfit especially embracing the feature of a lamp worn on the cap with small battery attached to the belt of the miner.

Electric hand lanterns have been in use in the mines for the past 10 years or more, so there is nothing new in the hand lantern arrangement. A lamp worn on the cap and the battery carried on the belt gives the miner, or user, the use of both hands; furthermore, wherever his head turns the light follows. I can conceive of no other arrangement that will find favor or adoption among progressive miners or mine operators.

Two Electric Safety Lamps

Foreign Correspondence

A description of the Ceag and Stach electric safety lamps as exhibited in the recent international competition.

The details of construction are set forth and a comparison made between the cost of this type of light and those burning oil.

The recent international competition for the best electric miner's safety lamp, promoted by the British Home Office, has resulted in a large variety of such lamps being submitted for investigation. Nearly 200 lamps were sent in for competition, of which nine received prizes.

The Ceag Lamp

It is proposed to mention two distinctive types in order to show the general lines upon which construction has proceeded. The first of these types is shown in Fig. 1 and is the Ceag lamp, which was submitted by the Ceag Electric Safety Lamp Co., of London, receiving the first prize of £600.

This lamp was constructed at the request of a mine owner, who had experienced one of the largest mine disasters of the last few years. It has been gradually improved from the first model to a very efficient type of electric safety lamp. It consists of three parts, an accumulator, the bottom part and the top part, and in spite of its strong construction, it only weighs a little over 4 lb.

Fig. 1. The Ceag Electric Safety Lamp

During the period of trials made by the judges in the competition, the lamp was repeatedly thrown on a stone floor without sustaining serious damage.

The accumulator consists of a strong celluloid casing and two lead electrodes, the latter being screwed into the lid of the casing. As they are of a circular shape, the warping which occasionally arises in accumulator electrodes, is avoided, and considerable strength is obtained. The lid is easily detachable so that the electrodes can be exchanged with ease.

An acid-proof closing arrangement to the battery allows free exit of the gas, but does not allow liquid to escape. On both pole ends are two loose contact pins with spiral springs forming the contacts for the current to the glow lamp. This arrangement, which is patented, prevents the dangerous oxidation of the contacts, as these can be easily cleaned after use by putting them into warm water.

Isolation of the Accumulator

The accumulator is separated by an intermediate space from the steel casing of the lamp, and is thus protected against damage in case of rough usage. The bottom part of the lamp is a stout circular casing of drawn steel plate, strengthened by steel ribs pressed into it and heavily tinned. The pot is of a cylindrical shape, made somewhat conical, and on the bottom is a small groove which keeps the accumulator in position, but at the same time allows of its being removed easily.

The top part of the lamp is fastened to the bottom casing by means of a bayonet joint, and can therefore be easily removed. The lamp is provided with a magnetic lock, which can only be opened by a strong magnet. The connection between the loose contact and the glow lamp is effected from a brass segment which is placed in insulating material. It is thus possible to switch the light on and off by turning the top part while the lamp is locked.

The lamp itself is of the metal-filament variety of 1½ cp., having a long life. The battery is of sufficient capacity to allow the lamp to burn for 16 hours on one discharge, charging taking four or five hours. The bulb is protected by a thick glass dome and four iron bars. It is placed between spiral springs, so that damage occurs much more rarely than in other lamps.

The Question of Cost

By this arrangement not only is it possible to secure great economy in the use of bulbs, but there is also safety in the presence of firedamp, as the circuit is automatically broken should the dome and glass be shattered.

In the selection of a safety lamp, the question of cheapness is sometimes decisive. With this lamp it has been found that in consequence of economy of labor in the upkeep, the cost was lower than that involved in the use of oil lamps. It is practically the only electric miner's lamp which has been in actual daily use for a number of years and the evident result of the practical experience thus gained is its great superiority from a technical and practical point of view.

The Stach Lamp

The other lamp which it is advisable to describe here is the "Stach" mining lamp, which was awarded a prize of £50 by the Home Office, and which is made by the Electrical Co., of London. Fig. 2

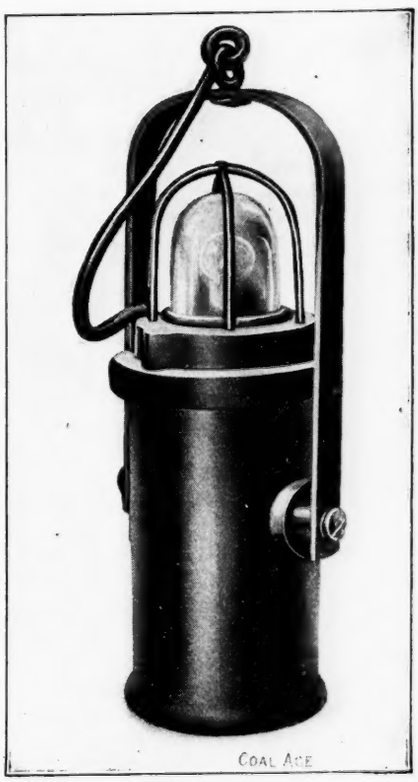


Fig. 2. Stach Miner's Lamp

shows photographically its general appearance, while Fig. 3 illustrates the working details of its construction.

It consists externally of a wrought-iron welded case carried by an iron bail, so arranged that the lamp is capable of being used in any position. To the top of this bail is attached a spiked iron hook for the purpose of suspending the lamp during work. On the top of the iron case there is fitted a brass ring rendered water-tight by means of a rubber gasket. The ring and the case are arranged to fit together and are locked by means of an iron pin worked by a spring.

On the upper part of the lamp is a stout brass wire guard protecting the glass globe and the glow lamp. This globe is of considerable thickness and is set upon a rubber ring which renders this part of the lamp water- and gas-tight.

The 2-cp. 2-volt metal-filament lamp is of the screw pattern, especially designed to obtain the maximum of safety. It has no tip, being so sealed off that the bulb is quite smooth. Between the leading-in wires a small wall of glass is interposed so that should the lamp be destroyed by the fracture of the bulb and filament, these wires cannot be brought together so as to cause a short circuit and dangerous spark.

In order to light the lamp the upper part is turned in a clockwise direction relative to the lower part, thus causing the contact springs to slide over the terminals of the accumulator, ensuring a good rubbing contact. The reverse operation, of course, switches the lamp off. There is no perceptible spark either at the opening or closing of the circuit and lengthy experiments have been carried out showing that the ignition of inflammable gas either inside or outside the lamp is impossible from this cause.

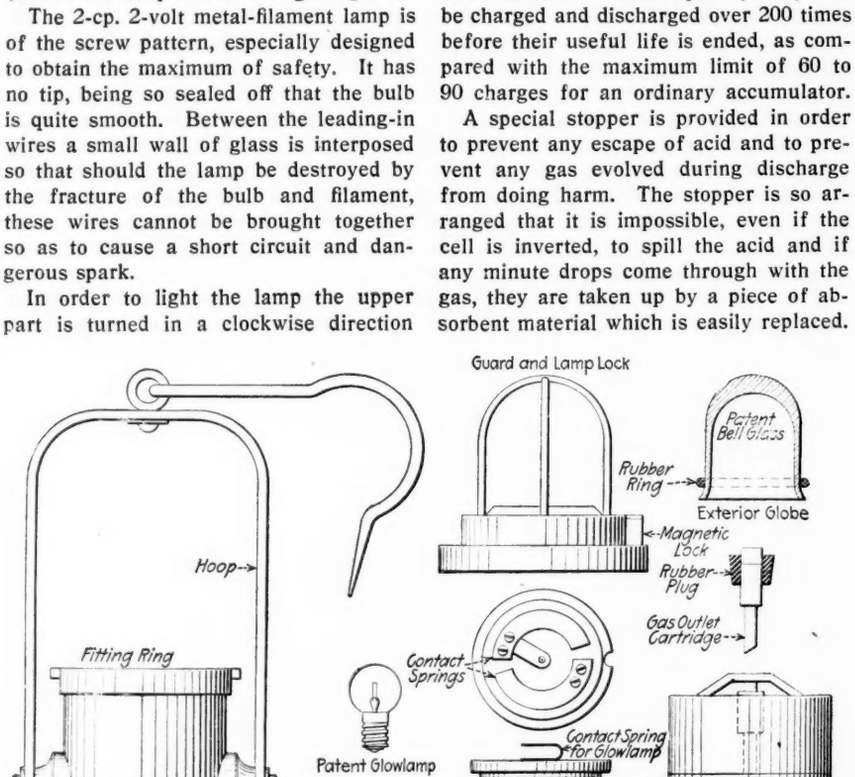


FIG. 3. DETAILS OF THE STACH LAMP WHICH RECEIVED AN AWARD FROM THE BRITISH HOME OFFICE

THE ACCUMULATOR

The cell consists of a 2-volt, round, semi-dry lead accumulator in a celluloid case. On the bottom of the cell is a celluloid projection placed eccentrically so that the cell always fits down into its proper position in the case and cannot be put onto the charging board in a reverse direction.

The electrodes are wrapped in cotton wool, which absorbs about two-thirds of the sulphuric acid used as electrolyte, and the plates are so prepared that they will stand rapid discharge and can be left for many months in a discharged condition without being damaged in the way in which most accumulators suffer by such treatment. Consequently they can be charged and discharged over 200 times before their useful life is ended, as compared with the maximum limit of 60 to 90 charges for an ordinary accumulator.

A special stopper is provided in order to prevent any escape of acid and to prevent any gas evolved during discharge from doing harm. The stopper is so arranged that it is impossible, even if the cell is inverted, to spill the acid and if any minute drops come through with the gas, they are taken up by a piece of absorbent material which is easily replaced.

The terminals consist of substantial lead blocks marked positive and negative and the celluloid case is hermetically sealed with the exception of the special stopper.

The battery is capable of operating the 2-cp. lamp for 14 hours on one discharge, while charging requires 1½ amp. for 12 hours. In some cases a concave nickel or aluminum reflector is provided, so as to project the light in a certain direction or to shield the eyes during use. The weight of the lamp ready for use is less than six pounds, and the cost of operation has been proved to compare favorably with that of the ordinary oil safety lamp.

ADVANTAGE OF ELECTRIC LAMPS

These two examples show the care in design which has been brought into prominence by the recent competition. There is no doubt that the electric lamp when constructed along the lines mentioned above is capable of giving a strong, well distributed, steady light. It will burn in any position, and the surrounding glass never gets clouded or dull. The bright and steady light makes the miner's work easier and more remunerative, while the safety against the ignition of inflammable gases either outside or inside the lamp is obvious.

West Virginia Examinations

Following is a list of the candidates who passed the examination held at Charleston, Aug. 14 and 15, 1912.

FIRST CLASS CERTIFICATES

Arthur P. Burdiss, Eccles, W. Va.
Wm. Dover, Eccles, W. Va.
George Mosgrove, Boomer, W. Va.
John Quigley, Minden, W. Va.
Thomas E. Sutton, Montgomery, W. Va.
George W. Kilburn, Plymouth, W. Va.
Wade C. Wales, Barracksville, W. Va.
B. F. Wriston, Wingrove, W. Va.
D. F. Johnson, Price Hill, W. Va.
Robert Watson, Whipple, W. Va.

SECOND CLASS CERTIFICATES

Jerry Utt, McClanahan, W. Va.
J. S. Griffith, Montgomery, W. Va.
L. A. Osborne, Olmsted, W. Va.
B. F. Carper, Raleigh, W. Va.
Wm. Bauman, Raleigh, W. Va.
Wm. Robson, Pratt, W. Va.
John W. Lilly, Paintsville, W. Va.
Charles J. Klanger, Glen White, W. Va.
George Edwards, Minden, W. Va.
M. P. Brown, Minden, W. Va.
Walter Jackson, Kingston, W. Va.
Harden Poirier, Clothier, W. Va.
W. J. Murphy, Williamson, W. Va.
James Risten, Kayford, W. Va.
J. B. Turner, Malden, W. Va.
W. D. Knight, Shrewsbury, W. Va.
John Porter, Boomer, W. Va.
Wayne Rumpius, Gamoca, W. Va.
Fred G. Wood, Sullivan, W. Va.
P. C. Geyer, Dorothy, W. Va.
Cornelius Wearmduf, Parrall, W. Va
Eli Mason, Montgomery, W. Va.
E. A. Carr, Kayford, W. Va.
Eddie Saulsby, Crown Hill, W. Va
R. C. Mitchell, Crown Hill, W. Va.
Joseph Fraser, Eagle, W. Va.
C. C. Parker, Eskdale, W. Va.
T. D. Samples, Barren Creek, W. Va.
H. M. Stone, Wyndall, W. Va
C. H. Workman, Vanetta, W. Va.
Fred Roberts, Scarbro, W. Va.
Garnet Gibson, Acme, W. Va.
W. W. Batton, Acme, W. Va.
W. A. Stull, Mahan, W. Va.
R. M. Odell, Chelyan, W. Va.
J. W. Lockwood, Jr., Branchfield, W. Va.
W. G. Crichton, 505 Brooks St., Charleston, W. Va.

FIRE BOSS CERTIFICATES

James Powell, Parrall, W. Va.
John Stewart, Carlisle, W. Va.
Will Ascough, Dorothy, W. Va.

Danger from shot-firing may be greatly reduced by observing the following points: (1) If possible, use an electric battery for shot firing. The handles should be detachable and the cable at least 20 yd. long. (2) Examine all working places carefully before firing. If possible, remove gas and dust if present. (3) Keep all detonators in a locked can. After removing one, relock the can. (4) Never shoot from the solid. All undercutting should be at least 6 in. deeper than the shot hole. (5) Use only just enough powder to do the work where the coal is full of slips and breaks. (6) Never tamp with coal dust. (7) Remove all powder before firing. (8) Use a copper scraper and a wooden rammer. (9) Only fire one shot at a time.

Conference on Mining at Pittsburgh

Special Correspondence

An account of the meeting of local and foreign engineers at Pittsburgh to discuss important problems. The conference is expected to bring about a closer working understanding which may prevent an unnecessary duplication of expensive experimental work. It is proposed to effect a permanent organization.

A meeting dignified by the lengthy title of the International Mining Experiments Stations Conference is now in session at the Arsenal Grounds, Pittsburgh, Penn. It is not a well-attended meeting, but the number present is no measure of its importance. The men are here to attend the sessions and compare notes so that they can be guided in making future experiments on mining devices and avoid making a duplication of each other's work. Appropriations are none too liberal and the utmost use must be made of the money secured for experimentation.

England is not represented. It is true that Wm. O'Connor is present from Argoed, Monmouthshire, Wales, but he has no connection with any testing station and is a private visitor occupying the position of manager at anthracite and bituminous mines in Wales.

Mons. J. Taffanel, of the Lievin testing station, started on his way, but on reaching New York City, was compelled to return to investigate the accident at the colliery in Lens. Mons. Weiss is, therefore, France's sole representative. Victor Watteyne, who made his first visit here at the invitation of President Roosevelt, after the Monongah and Naomi disasters, and who is in charge at the Frameries testing station, is present to represent Belgium.

Bergassessor Beyling, of Dortmund, represents the German testing station. Engineer Czaplinski represents the Austria-Hungarian testing bureau located at Rossitz.

A Preliminary Test at Bruceton

A preliminary test was held at Bruceton on Thursday, Sept. 12, in the experimental mine. This mine has been extended since the National First Aid Demonstration, and is now 1250 ft. long and has two butt entries. The one on the right is single and breaks off at 775 ft. from the main portal and is 100 ft. long. It dips slightly. A small fault of a few inches has been encountered and much water enters the mine in rainy weather and the butt heading is only maintained dry by occasional pumping.

Another butt heading has been driven to the left. This is double and is 200 ft. long. It does not figure in the recent experiments. The day was dry, and so the dust was not dampened by deposition of water and the experimental explosion was more violent than that which followed on Saturday.

The main heading which enters the hill at right angles to its contours, was filled up for 500 ft. with 5 shelves made of 3x4-in. stringers. These were bespread with 1 lb. of fresh coal dust per lineal foot of heading. At the 500-ft. point as measured from the portal, a standard testing-station cannon, loaded with 2¾ lb. of powder, was conveniently placed. The mouth of the cannon was tamped with clay. The muzzle pointed toward the entrance and the current of air moving in from the oblique gallery and circulating to the face of the parallel air entry, returned by the main entry and passed the cannon going outby so that when fired, the blown-out shot traveled in the direction in which the return air was moving.

No coal dust was spread anywhere but in the 500-ft. space between the cannon and the main portal. The explosion was not violent, but the flame leaped from the mouth of the drift and traveled in the open air to the end of the slate dump, which is 175 ft. from the portal. It also returned 50 ft. inby in the face of the advancing current and there died out. This was ascertained by wiring from the roof fragments of guncotton every 25 ft. Only two of these fragments were consumed.

It would be best not to detail the other events of the congress till the account of the later explosions of Saturday and Monday have been discussed.

Explosion Test on a Wet Day

Saturday the 14th was a wet day and the effect was manifest in the explosion. Not because the humidity of the air in the heading was so restraining, but the dust was rendered quite damp and the mine was not dry. The distribution of dust was unaltered from that which was used on Thursday, only it was extended to 650 ft. from the portal and the cannon was placed at 550, or 50 ft. further inby.

As has been said, the day was drizzling. The rain commenced early and continued till 10:30 a.m. Dust was placed at 11 a.m., and the work of charging the shelves was finished at 1 p.m., the shelves near the cannon receiving their charge about 12 noon.

Beyond the charge on the first 650 ft., there was no other fine coal used. The dust was subject to the passage of air for an average of 3 hours and the humidity in the airway was no less than 92 per cent. of saturation. The charge of powder was the same as in the preceding experiment and this time the explosion did not travel nearly so far. It stopped at station 100 outby, having traveled 450 ft. with the current, in the direction of the escape of the blown-out shot from the cannon. The explosion traveled inby only half as far as the entry was primed, namely, 50 ft.

The Test on Monday

On Monday, the cannon was set in the butt entry on the right, at its face, with muzzle directed away from the coal. The charge of powder was the same. There was no current of air in this butt heading, as there is no return airway constructed for it. The air traveled in at the main portal and out at the oblique, in the opposite direction to that on the two previous days.

The main entry was charged for the first 950 ft. with 1 lb. of coal dust per lineal foot of heading. The dust therefore extended 175 ft. beyond the butt entry and the flame of the explosion burst into the main entry with fuel to the right and to the left of it. To give it a good start, the length of the butt entry was charged with 2 lb. of dust per lineal foot.

Water stood at the face of the butt heading early in the morning, but was pumped out. Some passed to the mouth of the entry and some remained a few inches deep at the side of the entry at points between stations 550 and 650 (reckoning as usual from daylight). The water was perhaps 4 in. deep in the deepest place.

Despite the water the explosion was more severe than the one on Saturday. The flame traveled somewhat freakishly. The guncotton at stations 75 and 125 was burned, but at stations 50 and 100 there was no sign of flame. The fire licked up the guncotton at station 1150, the force of the explosion removed the guncotton from 1175, wire and all. The guncotton at 1200 remained and was found saturated with water. Evidently the water in the heading had been dashed violently over it.

The flame died out, therefore, when it faced the incoming current before the end of the fuel supply was reached. It traveled at least 200 ft. beyond the fuel supply on the return current. All of which shows that the law that the explosion favors the intake may be taken as not without important limitations.

Violence of the Explosion

The flame ended before the portal was reached, but the violence did not. A car of shale weighing about 3 tons stood 100

ft. from the drift mouth, and despite the fact that it was spragged, moved 50 ft. The explosion blew the door down at the entrance to the main air course. It lifted some of the loose unloaded sheets of iron covering the length of heading between the sheet-iron tube and the main oblique gallery. It did not, however, injure the fan. There was a prolonged blowing, which sounded like escaping compressed air rather than the sharp clap of an explosion.

The charge on Monday had been placed in about 20 min. and it is probable that the dust was reasonably free from deposited moisture, but the explosion which might have been as severe as that at the National First-Aid Demonstration was weakened in force by the general dampness of the mine and the muddiness of the mine floor.

On Tuesday, Sept. 17, members of the conference took part in a river excursion, which included a visit to the Carnegie Steel Co.'s plant, at Clairton. Some of those present also accepted the opportunity to attend a "smoker" given by local chemists.

Wednesday morning, Sept. 18, was devoted to a visit through the buildings of the Bureau of Mines and the Bureau of Standards. In the afternoon, at 3:30, the party journeyed out to the experimental mine, at Bruceton, and watched another explosion, which was planned to originate in the face of the left butt entry and arranged for the purpose of determining whether the explosion would travel toward the face of the air course or out the main entry.

A Discussion of Safety Lamps

On Thursday morning, Sept. 19, there was an exhibition and discussion of safety lamps in Building 17, at the Bureau of Mines. The afternoon was given over to demonstrations and discussions of electrical appliances designed for use in gaseous mines. Considerable attention was given to methods of testing hoisting ropes, safety catches, etc. In the evening, at 8 p.m., there was a business session to discuss the advisability and purpose of a permanent organization.

On Friday morning, Sept. 20, at the Bureau of Mines, there was a demonstration and discussion of explosives. The afternoon was devoted to attendance at another explosion test at the Bruceton mine. This last explosion, with heavy loading throughout the mine, was originated by firing the cannon placed at the face of the main entry.

It was planned by those in charge to have all who attended the conference spend Saturday (today) at the Bruceton mine, making an investigation of the results of Friday's explosion. In our next issue, Sept. 28, we will publish a more detailed account of the results obtained at the conference.

Coal Mining Institute of America

A meeting of the executive board of the Coal Mining Institute of America was held at 3 o'clock, Sept. 17, at the offices of S. A. Taylor, Lewis Block, Pittsburgh. The president, A. W. Colloway, and Secretary Charles L. Fay, were present, and the following members participated: W. E. Fohl, S. A. Taylor, E. Phillips, W. L. Affelder and R. D. Hall.

It was decided to hold the winter meeting in the auditorium of the mining department of the University of Pittsburgh, at the generous invitation of that institution. The dates set are Dec. 18 and 19.

The program is not fully decided, but papers will be presented by one of the officials of the Bureau of Mines and by George R. Delamater, E. B. Wilson and R. Dawson Hall. Other papers are partially provided, but their nature and authors cannot now be announced. A discussion on the methods now adopted for drawing pillars by machine is also proposed. The finances are more than usually flourishing and the membership has never been larger.

Recent Coal Strikes in the Anthracite Region

Special Correspondence

Numerous petty strikes occurred in the anthracite fields in the past week. District leaders of the union, however, appear to have a firm grasp of the situation and on their advice all the men have returned to work.

One of the most stubborn cases was that of the employees of the Hollenback and Stanton collieries of the Lehigh & Wilkes-Barre Coal Co. The men were determined to inaugurate a strike because company officials did not take up their grievances over the prices paid at the colliery.

The men were out only a short time when President John T. Dempsey of District No. 1 urged them to return to work. He conferred with company officials and obtained a promise that the grievances would be at once taken up and properly considered. As a result the men have been asked to decide which they prefer—contract or consideration work.

The Panther Creek Strike

In the Panther Creek regions a strike was called because two brothers, employees of the Nequehoning colliery, refused to join the union. This was a short lived dispute, since there is a clause in the new working agreement which prevents discrimination.

All the collieries of the D. L. & W. Co. have met and taken action on the cutting of wages among the miners. A grievance has been submitted to the company officials and if these officials do not give the miners the answer they want, the question will be submitted to the Conciliation Board.

All these troubles have kept the district officers busy but they have in no way interfered with the operations of the collieries for any great length of time. These petty disturbances do, however, continue to pile up work for the Conciliation Board, and there will be grievances of all descriptions for that body to decide before the winter has set in. Inasmuch as the work of the Board is slow, and because they meet but twice each month, the chances are that many grievances now on the books will not be reached for months to come.

The Meeting of the Conciliation Board

At the last meeting of the Conciliation Board, it was decided that coal companies must give the miners copies of any rates which they may have. These rates refer to the scale in operation in 1902 on which the increase under the new agreement is based. In return for this consideration the miners must also give the operators any rates they may have.

Testimony was heard on grievance 204, Lehigh Valley Coal Co., against U. M. W. A. and others. This is a case from the Hazleton regions and involves a strike at the Hazleton shaft. Two members of the grievance committee of the men appeared and declared that a strike had been called after they advised against it. S. D. Warriner on behalf of the companies, offered a resolution sustaining the grievance which would have decided the case for the company, but District President Thomas Kennedy of No. 7 asked to have the case postponed until more witnesses could be called.

The D. L. & W. Co. and the Dolph Coal Co. presented grievances against the calling of suspensions for celebrations and asked the board to make a ruling on this matter. The question was held over until the next meeting.

The Pennsylvania Coal Co. presented a grievance against its employees at the No. 9 colliery for a strike which had been called. The strike was over the election of a check docking boss and the board took action which should prevent trouble on this score in the future. A resolution was adopted which provides that in the future when there is a check docking boss to be elected, notice of the election must be given three days in advance by written notices posted at the collieries. All members of the board agreed to this resolution.

In the construction of coke ovens, ganister bricks are recommended, built in with segar-clay mortar; these bricks and the clay partly fuse and make a lasting air-tight oven.

Suggestions for New Zealand Mines

Special Correspondence

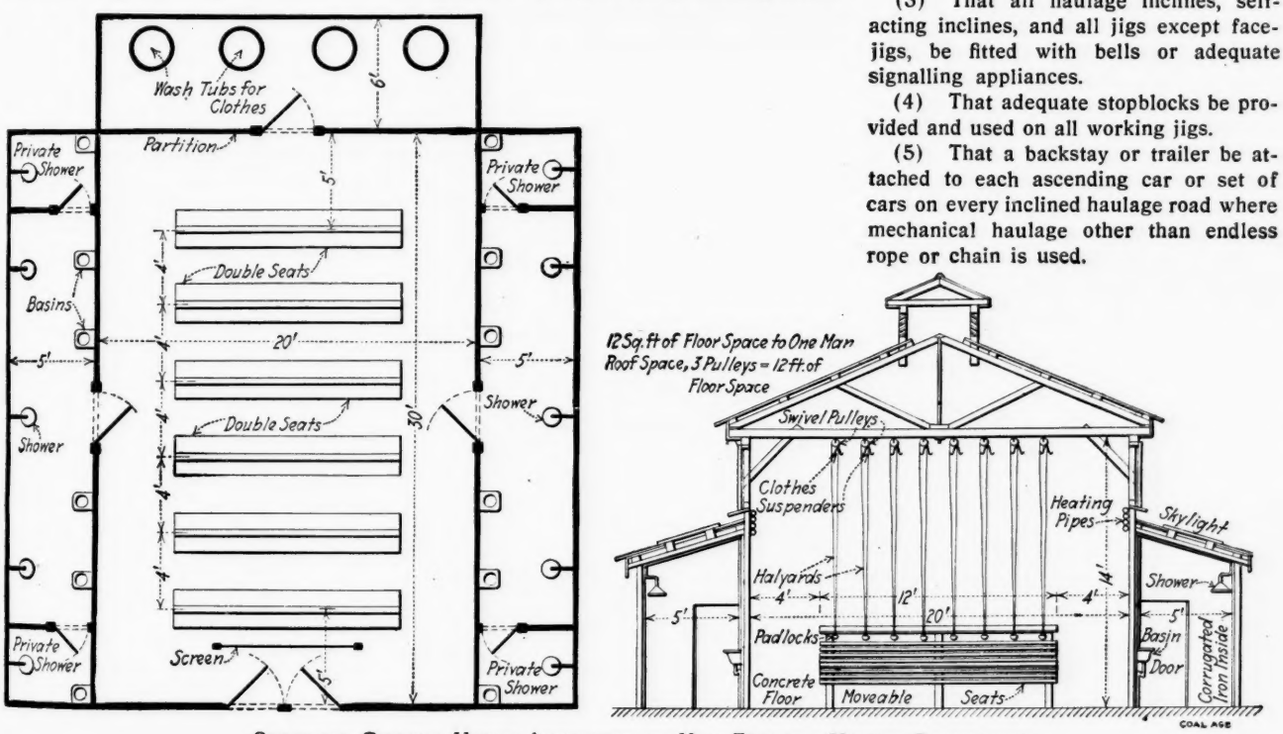
The commissioners who framed recommendations for the conduct of the coal mines of New Zealand are impressed with the importance of provisions for the reversal of the air current. They recommend that the air be required to contain definite limits of impurity and that rooms should not be permitted to exceed a certain width. Bath houses should be constructed.

Considering the population and mining limitations of the country, a large amount of evidence was collected by the New Zealand Royal Commission on Mines. The matters investigated related to the health and safety of the miners, and the report recently issued is a bulky foolscap volume of about 450 pages, consisting of the conclusions of the Commissioners and of the evidence submitted.

A few of the recommendations are here set forth in brief.

The Commissioners consider that the deputies or firebosses have not concluded their work when they have examined the roof and sides of the mine and have posted their warnings. They should also station themselves at some convenient place so that they can give a verbal report on the condition of his place to each man entering the mine.

spector of mines to withdraw the men. This provision it is explained may meet urgent cases during the absence of the government inspectors. It certainly seems a drastic recommendation for any commission to make.



STANDARD CHANGE HOUSE ADVOCATED BY NEW ZEALAND MINING COMMISSION

WORKMEN'S INSPECTORS

Workmen's inspectors, it is suggested, should have authority to inspect the mine once in every two weeks, and also whenever notified that the mine or a part of it is dangerous. The Commission suggests that perhaps the statement of two miners should be sufficient to justify such an inspection. The workmen's inspector being satisfied that the conditions are dangerous, may then, "request the mine manager to stop work at the place and withdraw all men therefrom, and discontinue or rectify any dangerous practice." Should the manager refuse, the workmen's inspector may apply to the in-

COMMISSION WOULD REGULATE WIDTH OF ROOMS

It is suggested that the maximum width of rooms and crosscuts in room and pillar workings should be 12 ft. and 9 ft., respectively, for a distance of 2 yd. when opening out or breaking away, and thereafter 18 ft. and 12 ft., respectively. Systematic timbering in its modern sense is advocated, and objection is raised to the use of three-cornered bars or caps in set timbering. It is suggested that no timber should be withdrawn "except by lever and chain or by blasting."

HAULAGE REGULATIONS

Bearing on the haulage question, the commissioners recommend:

(1) That the use of chains be prohibited on all haulage roads but face-jigs,* and that wire ropes be substituted therefor.

(2) That anchor chains be supplied, and their use made compulsory on all face-jigs.

(3) That all haulage inclines, self-acting inclines, and all jigs except face-jigs, be fitted with bells or adequate signalling appliances.

(4) That adequate stopblocks be provided and used on all working jigs.

(5) That a backstay or trailer be attached to each ascending car or set of cars on every inclined haulage road where mechanical haulage other than endless rope or chain is used.

PROVISION TO REDUCE LIABILITY TO EXPLOSIONS

In almost all the large coal mines in New Zealand, ventilating fans have been installed; but, of course, there are some exceptions, and the commissioners are of the opinion that both ventilating and boiler furnaces should be prohibited in fiery mines. Ventilating appliances should be on the surface, with a proviso for

*Face jigs are defined by the commissioners as self-acting inclines by which coal or other mined material is removed from the working face to the heading below. Ropes are not required in such places because they cannot be extended as the working face advances, whereas a chain can easily be extended by adding more links.

auxiliary fans underground where required.

In dry and dusty mines, the use of water should be compulsory in all roads where the dust cannot otherwise be conveniently removed, but a proviso is added exempting return airways from this requirement. It is recommended that only permitted explosives be allowed in pillar workings where safety lamps are compulsory or in coal mines where firedamp has been found within the preceding three months.

The explosives should be fired only by safety igniters, but if the inflammable gas found in the place of firing does not amount to one-half of 1 per cent., electric exploders may be used. Should a shot which was to be exploded by means of a fuse fail to go off, one hour should elapse before the shot lighter returns. If the firing was to be produced by an electric current, after one-half-hour delay, the shotfirer may return to the working place.

The Percentage Requirement in Ventilation

While, of course, it is required that the ventilation shall be such as to render all inflammable and noxious gas harmless, yet it is recommended that to meet this provision, the air shall not contain either less than 19 per cent. of oxygen or more than 1 per cent. of carbon dioxide.

While the mines should be classified according to the amount of inflammable and noxious gases in the main return airway, it is proposed that in no case shall less than 150 cu.ft. of air per minute be provided for each person, and 600 cu.ft. of air per minute for each horse employed underground. Further, the total number of men ordinarily employed in any ventilating section may not exceed 50 at one time. It is also recommended that means should be provided for reversing the air current and these means should be maintained in condition to be put into immediate operation. Arrangements for this reversal are illustrated in the report, and the drawing is reproduced herewith.

Bath Houses

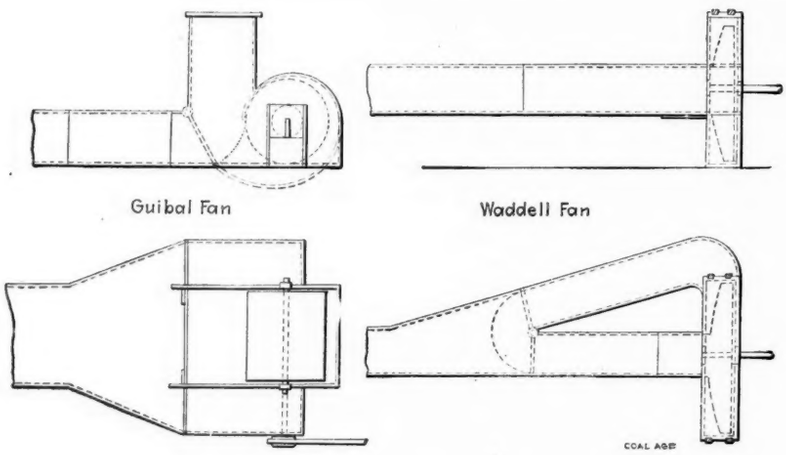
The commission finds the request for change and bath houses for miners has been unanimous, and the medical evidence emphasized the necessity for such provisions in the interest of general health. The constant exposure of men to warm temperatures in more or less vitiated air underground renders a sudden change, in wet clothing, to colder conditions above ground highly injurious to health.

For the most part it is impossible for miners' dwellings to be supplied with bathing accommodation, and therefore the commission recommends that both change and bath houses be provided at all mines. It is not proposed to make the use of the baths compulsory, the view being that such a provision would be unworkable, but the workers' representatives indicated that the men would largely avail themselves of the bathing facilities.

In order that the change and bath houses, so far as possible may be erected and fitted on a uniform plan, the commission had prepared a draft of a change and bath house which they consider will suit all mines. This design accompanies this article.

The bath houses, however, need not be provided unless enough men request their erection. The number necessary to compel the operating company to install them is 75 per cent. of the underground workers where the number is 20 or under; 50 per cent. where the number is 50 or under, and 30 per cent. where the number is over 50.

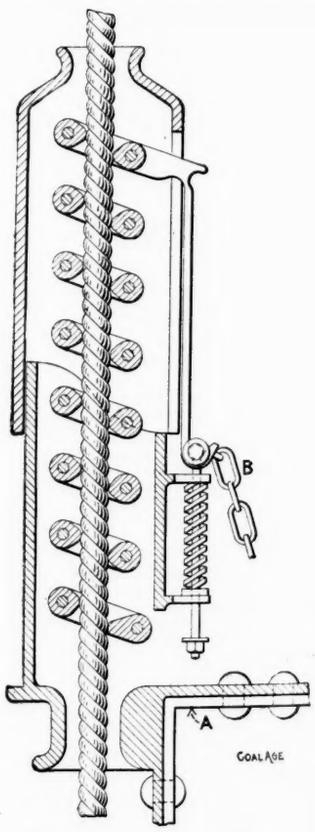
Then there is a proviso that if the small number using the baths proves an indifference on the part of the workers to the advantages of the bath house the manager may close it or leave it open at his option. There must be not less than 20 per cent. of bathers where the underground workers number less than 50 and 30 per cent. where there are more than 50 subterranean employees.



Methods for Reversing Guibal and Waddell Fans as Advocated by Commission

Mine Cage Safety Gripping Device

The accompanying illustration shows a newly patented apparatus which is designed to prevent accidents by the falling of cages in mine shafts. One end of the device is connected to the cage *A*, while the other end has a spring arrangement and a system of levers or connections, which come into action, when the lifting rope breaks, by means of the chain *B*, and produce the grip on the guide rope or rod, so that the weight of the falling cage causes the device to extend and produces the gripping action.



Safety Device for Cages

The idea has been patented by L. S. Rayner, Gaergwrle, England, July 9, 1912.

Gaseous mines should be carefully examined by the fireboss on all idle days such as Sundays or holidays; also, if a mine has not been worked for a few days a most careful examination should be made before the workmen are allowed to enter.

Current Coal Literature

The Best Thought Culled from Contemporary Technical Journals, Domestic and Foreign

Oil Mixed Concrete

In a recent publication of the U. S. Bureau of Roads, L. W. Page, the director, gives the following information regarding "Oil-Mixed Portland Cement Concrete":

"When experimenting in the office of public roads in an attempt to develop a nonabsorbent and dustless road material, one capable of withstanding the severe shearing and raveling action of automobile traffic, my investigation led me to a promising discovery. I found that, when a heavy mineral residual oil was mixed with portland-cement paste, it entirely disappeared in the mixture and, furthermore, did not separate from the other ingredients after the cement had become hard.

No Loss in Tensile Stength

"The damp-proofing properties of concrete mixtures containing oil have been demonstrated very definitely by laboratory and by service tests, which establish this material as one of great merit for certain types of concrete construction. It has also been shown that the admixture of oil is not detrimental to the tensile strength of mortar composed of 1 part of cement and 3 parts of sand when the oil added does not exceed 10 per cent. of the weight of the cement used.

The compressive strength of mortar and of concrete suffers slightly with the addition of oil, although when 10 per cent. is added the decrease in strength is not serious. Concrete mixed with oil requires 50 per cent. more time to set hard than does plain concrete, but the increase in strength is nearly as rapid whether oil is used or omitted.

Almost Perfectly Waterproof

Concrete and mortar containing oil admixtures are almost perfectly nonabsorbent of water, and so they are excellent materials to use in damp-proof construction. Under pressure, oil-mixed mortar is very efficient in resisting the permeation of water.

Laboratory tests show that oil-mixed concrete is just as tough and stiff as plain concrete, and furthermore its elastic behavior within working limits of stress is identical with that of concrete without oil admixture.

The bond or grip of oil concrete to steel reinforcement is much decreased when plain bars are used. Deformed bars, however, and wire mesh or expanded metal will reinforce this material with practically the same efficiency as in ordinary concrete.

Several tanks constructed of oil-mixed concrete in the testing laboratory of the Office of Public Roads have remained absolutely water-tight since their completion over a year ago. One of these tanks was made of a mixture of concrete composed of 1 part of cement, 2 parts of sand and 4 parts of stone, mixed with 10 per cent. of oil, based on the weight of cement in the mixture.

It is used for storing concrete test specimens and is 14 ft. long by 5 ft. wide by 4½ ft. deep. The bottom of this tank is 4 in. thick and is deposited on the cement floor of the laboratory. The sides are 6 in. in thickness and are reinforced with one-half inch deformed steel bars.

A second tank was built successfully by merely plastering oil-mixed portland-cement mortar against ½-in. mesh expanded metal. Although the sides and bottom of this tank are but 1 in. thick, it is absolutely water-tight against 2 ft. of head.

Spontaneous Combustion of Coal

By Horace C. Porter*

The preliminary stages of spontaneous combustion are often confused with weathering and consequently the latter has been regarded as a more serious action than it is proved to be, on more careful observation. The action of water in increasing combustion is attributed to the effect it has in consolidating the slack locally and preventing due ventilation.

*Bureau of Mines.

Note—Second Instalment of article presented to the Pittsburgh Section, American Chemical Society, under title "Storage of Coal and Spontaneous Combustion." Previous installment appeared September.

When spontaneous combustion occurs in a coal storage pile, the loss of value is much greater than occurs from mere weathering and is indeed a very serious matter. Even though actual fire, with incandescence and flame, does not occur, the loss by oxidation, if the coal is heated, is a serious one, since the rate of oxidation of coal increases very rapidly as its temperature rises.

Furthermore, at a moderately elevated temperature, changes begin to take place in the composition of the coal substance which affect its coking quality and its yield of gas and byproducts. When once a fire has well started in the under portions of a large coal pile or bunker, it is almost impossible to extinguish it by the ordinary means. Water or steam will not penetrate through the coked arch formed over the hot pocket, and the only effective recourse is removal of the heated portions.

Spontaneous Combustion Frequent

A byproduct coke plant in the Middle West reports that its 100,000-ton stock pile of smokeless coal which is renewed every summer, is on fire from spontaneous heating for at least three months of every year. A large power plant in New York reports that one or two of its 200 odd coal bunkers, each holding 2000 to 3000 tons, are always either on fire or badly heated.

Spontaneous fires in ships' cargoes of coal were very common 30 years ago. It is recorded that in the 9 years from 1873 to 1882, 57 boats sailing from British ports were lost through spontaneous combustion of their coal cargoes. The bureau recently investigated a troublesome bunker fire on a Panama steamer sailing between New York and Panama, the fire undoubtedly having started from spontaneous combustion in coal which was left on board during several trips and lying near the boilers next to a hot bulk-head.

Low Volatile Coals as Subject to Ignition as Rest

A circular letter was sent in January, 1911, to more than 2000 large coal consumers throughout the country in order to gather statistical information on cases of spontaneous fires in coal. The results of this inquiry are tabluated in Table I.

The results of the inquiry point to the Appalachian coals as furnishing a majority of the total cases reported even when compared on the basis of the respective percentages of cases in the re-

plies from each section of the country. The results also show that the "smokeless," low volatile Appalachian coals have been found at least no less dangerous for storing than other types.

TABLE I. REPLIES TO LETTERS OF INQUIRY ON SPONTANEOUS COMBUSTION

Total number of replies received	1,192
Replies from Eastern section of United States	762
Replies from Central and Western sections.	369
Replies reporting cases of spontaneous combustion	260
Cases reported which named the coal	220
Cases reported in "smokeless" coals (Appalachian)	95
Cases reported in other Appalachian coals.	70
Cases reported in Interior and Western coals	55
Per cent. of cases in the total replies received	21.8%
Per cent. of cases in the Eastern replies received	25.3%
Per cent. of cases in the Western replies received	18.1%

Probably these results have been influenced by the fact that those coals, particularly the smokeless variety, are more frequently stored than are the fuels of the West. These latter coals are more generally feared by consumers who purpose storing large quantities because they are known to lack in storage qualities, and are subject to spontaneous heating.

Coal is a Poor Conductor of Heat

Spontaneous combustion no doubt results from the accumulation in a combustible material of the heat derived from its oxidation, or occasionally the heat of other chemical reactions, of fermentation, or of bacterial action. It is a fact that coal oxidizes at the ordinary temperatures of the air and develops heat thereby.

Since coal is a very poor conductor of heat and its specific heat also is low, its temperature may rise rapidly in pockets where the transfer of heat by connection currents of air is restricted. As showing the poor heat conductivity of coal, instances are known of snow remaining unmelted beneath a coal pile during the entire summer.

Cape Breton coal stored in Nova Scotia during the summer has been found after shipment to Montreal to contain Cape Breton snow of the previous winter. Temperature measurements in a coal pile often show ordinary air temperature in one spot and an actual fire in another not 3 feet away.

Coal Becomes Oxidized

In studying the question two phases present themselves: (1) What is the primary source of the heat and how can the reactions causing it best be reduced in intensity or entirely eliminated? (2) How can the physical conditions of storage best be regulated so as to permit dissipation of the heat?

In answer to the first question, the fact may be cited first that coal standing in closed bottles at ordinary temperature rapidly takes up the oxygen of the air. An air current passed slowly over a sample of coal in a warmed tube loses oxygen to the coal in amounts rapidly increasing with rise of temperature, and the temperature of the coal also rises above that of its surroundings.

Experimental Combustion by Oxidation

When the conditions are exaggerated by passing 50 per cent. oxgen over the coal and by heating the fuel to 284 degrees F. some coals easily ignite under the influence of the air current. Different coals show different temperature rises under the same conditions and the rise does not appear to be parallel to the sulphur content.

These experiments clearly bring out the fact of the absorption of oxygen by coal at ordinary temperatures either by the carbonaceous material of the coal substance or by its mineral impurities, such as sulphides of iron; also the fact of the development of heat by such oxidation.

Influence of Pyrite and Marcasite not Disproved

The comparative rates of heat development by oxidation in coal substance proper and in iron pyrites remain to be settled before judgment can be passed on the disputed question of the importance of pyrites in spontaneous combustion. Pyrites, and particularly its near neighbor, of the same composition, marcasite, without question oxidize by weathering and thereby develop heat.

Moisture is necessary to the reaction. Though the amount of pyrites present may be small, it may nevertheless act as a kindler, giving a little initial heating which will start rapid oxidation in the coal. On the other hand, if its rate of oxidation in moist condition can be shown to be slower than that of coal substance itself, there can hardly be adequate reason to consider it a dangerous element in the initial heating.

In a laboratory test in which 50 per cent. oxygen was passed over coal heated to 284 and 324 deg. F., it was shown clearly that some kinds of coal undergo oxidation more rapidly than others. But unfortunately for the value of our test, many of the coals which show little or no heat development in this test prove in practice to be dangerous coals to store.

We are led, therefore, to a consideration of factors other than ease of oxidation, e. g. the effect of physical conditions of storage on the accumulation or dissipation of heat—the second important factor mentioned above as concerned in the problem.

The Physical Factor in Self-ignition

As the oxidizing action on coal is, in its beginning, largely a surface action, the amount of surface exposed or the fineness of the coal and the amount of dust present, will have large influence on the intensity of the action. A committee of the American Railway Maintenance of Way Association reported that in its opinion the presence of dust in a coal stock was the prime cause of spontaneous combustion.

Many other authorities have expressed similar warnings. An instructive instance from commercial practice is furnished by the Calumet & Hecla Mining Co. At the Tamarack coal dock near Houghton, Michigan, a stock of 100,000 tons of Pittsburgh run-of-mine coal was continually giving trouble with spontaneous fires until a year or so ago.

At that time the plant was improved and enlarged to double its capacity and a provision was made for screening the coal before storing. On elevating from the boats, the coal passes over screens which discharge the stock onto railway cars for immediate use, the lump being sent to the stock pile. Practically no trouble with fires has been encountered since the new system was installed.

Friability in coal is thus a factor in promoting spontaneous heating. Run-of-

TABLE II. BREAKAGE TESTS OF COAL

50 pounds lump of coal, over 2-inch screen, dropped 6 feet on an iron floor, 4 times without intermediate screenings.

Description	Percentage Passing 2-inch.	½-inch.	¼-inch.	Loss in Test, Per Cent.	Remarks.
Pocahontas, W. Va.	56.3	25.6	11.9	0.0	McDowell Co., W. Va
Pocahontas, W. Va.	51.8	23.8	10.1	.3	McDowell Co., W. Va.
Pocahontas, W. Va.	54.0	24.8	11.6	0.0	McDowell Co., W. Va.
Pittsburgh bed	47.1	13.1	4.4	.6	Greensburg, Penn.
Pittsburgh bed	45.5	14.4	4.8	.5	Greensburg, Penn.
Pittsburgh bed	46.5	14.3	4.3	.4	Greensburg, Penn.
Clearfield Co., Penn.	70.3	30.8	13.1	.8	Imperial (and other mines).
Fire Creek seam	70.1	26.7	11.3	.3	Fayette Co., W. Va.
Battleship Maine	69.6	22.2	8.4	.3	Sunmerged 14 years.
Blockton, Ala.	48.3	11.6	3.7	0.0	
Carterville, Ill.	44.6	11.0	3.4	0.0	Williamson Co.
Dawson, N. M.	47.5	10.5	3.3	.1	
Dawson, N. M.	44.8	10.1	3.0	.1	
Kemmerer, Wyo.	54.3	10.5	3.3	0.0	
Kemmerer, Wyo.	55.1	11.1	3.4	0.0	
Eagle Pass, Tex.	53.8	10.8	2.8	.3	
Eagle Pass, Tex.	55.0	10.9	2.6	.4	
Chimney Rock, Mont.	46.4	14.5	2.5	0.0	
Chimney Rock, Mont.	43.3	12.3	3.9	.3	
East Creek, Wash.	42.5	8.4	2.5	.4	
East Creek, Wash.	43.3	8.0	2.4	0.0	
Black Diamond, Wash.	74.9	25.5	5.6	.3	
Carneyville, Wyo.	43.8	9.0	2.4	0.0	Sheridan District.
Carneyville, Wyo.	44.9	10.8	2.8	.3	Sheridan District.

mine coal is often subjected to 10 to 15 drops during the course of its handling between mining and placing in stock; and when received by the consumer it often contains 90 per cent. or more of material that will pass a 1-inch screen.

The following results of comparative breakage tests by the 6-foot drop method show this variation between coals in friability and show also the comparatively large friability number in the low volatile, smokeless type.

Ventilation Both Aids and Hinders Ignition

Other important factors affect the dissipation of heat in a coal pile. Facility of air passage through the material influences in large measure the accumulation of heat. If the amount of air which can penetrate to a warm spot in the interior is sufficient to produce heat at a faster rate than it can be carried away in the same air current, the result will be a rise in temperature.

If air penetrates very slowly, as it does in fine slack coal, the rate of combustion is very slow and very little heat is developed. If air penetrates abundantly when the coal has not yet become much heated it is cooled by the convection currents of air.

Some studies of spontaneous fires in a large coal pile at a commercial plant in the Central West have well illustrated these points. Temperatures were taken at different depths in the pile and samples of air withdrawn at the same time.

Excess of Carbon Dioxide in Stock Piles

Where the coal was warm, the oxygen percentage in the air was found to be reduced considerably below normal and CO_2 was found, although not in quantities proportionate to the oxygen absorbed. In some places the oxygen was very low, although the temperature was still much below the danger point, this condition being due to restricted air circulation.

At only 9 feet below the surface at one of these points the air was almost entirely exhausted of oxygen. A pocket of fire discovered at 23 ft. depth at another point proved an interesting instance of high heating in one small spot. At this point there was a free draft of air from below the fire, as shown by the normal percentage of oxygen just below the pocket.

The conditions here were probably such as have been described above as favorable to continuous heat development, viz., the free access of sufficient air to support the combustion and of air warmed somewhat by passing through 20 ft. or more of the coal.

The Action of Rain

It is often noticed that after a heavy rain or alternating wetting and drying, an open coal pile heats spontaneously. This is possibly due to the washing of dust and fines down into a compact layer 2 or 3 ft. below the surface, where, in moist condition, its under portions start to heat and are protected from cooling air currents.

As general conclusions, it may be said that some kinds of coal are more liable than others to spontaneous heating but that all bituminous coals will heat if the conditions of storing are of a favorable kind. Large deep piles, over 15 ft. in depth, are always dangerous and a large percentage of dust is one of the biggest elements of danger.

Conclusions

A mixture of fine coal with a small quantity of lump, which provides access to a limited supply of air, affords an ideal state of affairs for heating. Freshly mined or freshly crushed coal heats more easily than that which is old. By rehandling after two months' storage further risk can probably be avoided. Moisture and sulphur are possibly dangerous factors in starting the initial heating, but the importance of their influence is hardly as yet established by experimental evidence.

Efficiency of Waterproofing

T. R. Lawson, of Rensselaer Polytechnic Institute, recently made tests on the strength of cement mortars and their absorption of water when they are mixed with certain waterproofing materials now on the market. The results are quoted from an article in *Engineering News* on "Four Alternate Designs of a Hollow Concrete Dam across Stony River," Grant County, West Virginia, by Edward Wegmann.

TABLE I—LIST OF WATERPROOF COMPOUNDS TESTED

Trade Name	Manufacturers
Shamrock	McCormick Waterproofing Portland Cement Co., St. Louis, Mo.
Medusa	Sandusky Portland Cement Co., Sandusky, O.
Metal-crete	Klein Manufacturing Co., Cleveland, O.
Marvel	Goldstein Waterproofing Products Co., New York
Integrol	Wemlinger Steel Piling Co.,

TABLE II—STRENGTH OF MORTARS WITH AND WITHOUT WATERPROOFING COMPOUNDS

(Mixture one part cement, two parts sand. Kept one day in air, 34 days in water)

Waterproofing used	Per cent. of Waterproofing	Strength lb. per sq.in.	
		Tensile	Compressive
None	...	490	4655
Shamrock	3	469	4136
Medusa	4	417	3889
Metal-crete	5	454	5055
Marvel	1	466	3412
Integrol	1 in 25 parts water	391	....
Crude Oil	10	362	4509

TABLE III—TEST FOR ADSORPTION

Compound	Weight of Cubes	Weights after Pressure Test
	grams	grams
Shamrock	3320	3309
Medusa	3532	3559
Metal-crete	3542	3526
Marvel	3508	3512
Integrol	3462	3453
Crude oil	3454	3450

(Blocks 4x4x6 in. were cast and a ¼-in. pipe open at the ends was imbedded in the center of each block. After they had set 38 days they were subjected to a water pressure of 75 lb. per sq.in. through the pipe for a period of 72 hrs. with the above results).

It is evident that the cubes do not absorb water, because the weights after pressure are less than before.

Illinois Coal Statistics

The following is a summary of the Illinois coal statistics for the year ended June 30, 1912:

Number of counties producing	52
Number of openings of all kinds	879
New mines or old mines reopened during the year	176
Mines abandoned since last report	142
Total output of all mines, in short tons	57,514,240
Number of shipping mines	380
Total output of shipping mines	56,096,695
Number of mines in local trade only	499
Output of local mines	1,417,545
Total tons of mine-run	13,366,509
Total tons of lump	21,795,527
Total tons of egg	4,340,431
Total tons of nut	3,193,956
Total tons of pea	11,109,191
Total tons of slack	3,108,626
Total tons shipped	51,502,382
Tons supplied locomotives at the mines	924,854
Tons sold to local trade	2,615,678
Tons consumed (or wasted) at the plant	2,471,326
Average days worked at shipping mines	172
Average days worked at all mines	160
Number of motors in use	371
Number of mines using mining machines	137
Number of mining machines in use	1,599
Number of tons undercut by machines	25,455,059
Number of tons mined by hand	32,059,181
Average number of miners employed during the year	39,149
Average number of other employees underground (men)	31,687
Average number of boys employed underground	1,526
Average number of employees above ground	7,049
Total number of employees	79,411
Number of persons at work underground	72,362
Average price paid per gross ton for hand mining (shipping mines)	$0.636
Average price paid per gross tons for machine mining	0.496
Number of kegs of powder used for blasting coal	1,313,448
Number of kegs of powder used for other purposes	3,040
Number of pounds permissible explosive	328,075
Number of men accidentally killed	180
Number of men injured so as to lose a month or more of time	800
Number of gross tons mined to each life lost	319,524
Number of employees to each life lost	441
Number of deaths per 1,000 employed	2.26
Number of gross tons mined to each man injured	71,893
Number of employees to each man injured	99

A French method of shaft sinking through water-bearing strata is to drill six holes in a circle around the site of the proposed shaft. When this is done a cement-grouting is pumped through the holes into the fissures, thus filling all interstices. The shaft is then put down as if through solid rock.

Who's Who—in Coal Mining

Devoted to Brief Sketches of Prominent Men, Their Work and Ideas

Coal mining is a many-sided industry, and as a consequence various types of men having altogether different training are essential to the successful conduct of the business. One phase of the work, second only to the job of producing the coal, is the problem of consuming the output. We have written a number of sketches concerning the lives of the men who are in charge of actual development operations, and it is about time we give attention to some of those who are devoting their life to methods and plans for the economical use of the raw product.

Out in Chicago there is a fellow named Bement, to be more concise A. Bement, who has been doing a lot of work, and incidentally much good, along lines and concerning problems that bear directly on the performance of fuel in boilers. Coal men who know whereof they speak casually remark that no man in the country is better posted on "boiler performance" than said gentleman just referred to.

To be quite explicit and somewhat exact in our recital, A. Bement was born in Appleton, Wis., a number of years ago, the date we withhold for the all-sufficient reason that it was no further back than 1910 when he recklessly launched in an adventure on matrimonial seas. It must be evident to the reader, therefore, that when a fellow pursues the even tenor of a bachelor life for many years and suddenly awakens to the grievous error of his ways, he is not particularly desirous of having his friends discover how slow he was to perceive the wisdom of a condition or approved state of existence which was so plainly visible to other discriminating minds.

Soon after his advent among the inhabitants of Appleton, the parents of Mr. Bement moved to Waukegan, Ill., and when the boy was nine years old, the elder Bement again changed his residence, this time locating in Chicago. Since that year in his early youth "A. B." has never permanently forsaken the wind-swept shore bordering on the southern extremity of Lake Michigan.

His earlier work was in connection with a manufacturing machine shop in which he occupied several positions, including that of superintendent. This early business experience afforded him excellent training along mechanical engineering lines. For the last fifteen years he has practiced as a consulting engineer, and in 1910 was married to Miss Eva Henderson, of Berkeley, California.

A. BEMENT

While he has not attempted to specialize in any particular branch of engineering work, the demands of certain of his clients have led to his conducting an extensive line of research, concerning fuels and their utilization. This work has gone into every branch of the subject of coal mining, including geology, prospecting territory, preparation, and especially the utilization of coal under boilers, industrial furnaces, gas producers and domestic fires. Much of Mr. Bement's work having been along original lines, he has written a number of articles describing the results obtained.

Among his papers are several relating to smokeless combustion of coal, efficiency of boilers, furnace performance in its different phases, combustion and gas analysis, and the effect of ash on the value of coal. Other discussions which he has prepared have dealt with the effect of the size of the pieces of coal on its value, deterioration of coal in storage and disposition of coal to slack. His investigations on the attainment of smokeless combustion, and his insistence upon a rational interpretation of the coal analysis, are two of his hobbies.

One especially valuable research he conducted, and an investigation which was of much economic importance, is quoted at length in Bulletin 18 of the U. S. Bureau of Mines, page 155. This paper describes a simple means whereby the efficiency of boilers may be increased. Other research work which relates to the escape of water with steam from boilers was described by Mr. Bement in the Transactions of the American Society of Mechanical Engineers, Vol. XXVI, page 312. A valuable and interesting article of his appeared in *Power*, April 25, 1911, under the title of "The Coal Problem Analyzed."

In 1907 Mr. Bement prepared the Peabody Atlas of Coal Mines and Coal Railroads, which covers the territories of Illinois, Indiana, western Kentucky, Ohio, Michigan, Iowa and Missouri. This volume contains many maps and gives a brief outline of the geology of the different districts.

No better evidence of the high regard in which Mr. Bement is held by the engineering fraternity can be presented than the action of the Illinois State Geological Survey in selecting him to prepare a paper on the Illinois coal field for official publication and public distribution. When the "Illinois Survey" goes outside of its own organization to ask a practicing engineer to make up a paper of this kind instead of doing the work themselves, it means something.

Mr. Bement has been interested in many works of public benefit. He was consulting engineer to the Chicago Smoke Abatement Commission during Mayor Bussee's administration. He is a representative of the Western Society of Engineers on an advisory committee to the Engineering Experiment Station of Illinois, for the purpose of supervising coal-testing work. At the present time he is first vice-president of the Western Society of Engineers, and has been awarded the Chanute medal of that Society on three different occasions for meritorious papers on engineering subjects.

He is a charter member of the American Institute of Chemical Engineers; member of the Committee on Coal Tests and Specifications of the American Society for Testing Materials; chairman of a committee appointed by both the Western Society of Engineers and the American Institute of Chemical Engineers, to devise a rational code for the test of steam boilers.

His name appears in "Who's Who in Mining and Metallurgy;" "Who's Who in the World;" "Who's Who in America;" "Who's Who in Science;" "American Men of Science," and the book of Chicagoans.

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This journal is interested solely in matters relating to the fuel industries, and is designed to be a medium for the free interchange of ideas, the detailed description of coal-mining practice, and the expression of independent thought calculated to benefit both operator and miner.

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COAL AGE

Daily Mine Inspection

We print, in this issue, a contribution of A. H. Donaldson, dealing with the frequent occurrence of avoidable mine accidents, as revealed by the various reports of the mine inspectors in the different states. After referring to the fact that this class of accidents is due chiefly to the carelessness, recklessness, or ignorance of the ordinary miner and to the enforced employment of a large percentage of foreign labor, who are unacquainted with the English language and unfamiliar with the work of mining or the dangers to which they are exposed, Mr. Donaldson makes the suggestion that this class of accidents could be reduced 50 per cent. or more by the appointment, in all mines having an output of 500 tons per day or over, of what he terms a "safety boss."

There can be no doubt, in any practical mind, that a closer inspection of all mine passageways and working places, by competent mine officials would greatly reduce the accident list. There is no doubt but that this class of avoidable accidents is, as Mr. Donaldson says, the result of carelessness, recklessness and ignorance, on the part of the miner. There is no doubt but that it is the duty of all mine officials, particularly the mine foreman and his assistants, including the firebosses, to watch closely every working place and become familiar with the habits and practices of every miner employed and to give needed instruction wherever required.

As stated, however, this daily inspection of the mine and its working places, under the present system of mining, is the duty of the mine foreman and his assistants, including all firebosses. In many instances, the mining law requires that the mine foreman who finds he is unable to attend to the duties required of him, shall employ as many assistants as are necessary to enable this work to be properly performed.

We cannot agree with Mr. Donaldson, therefore, in the suggestion that it is necessary or advisable to multiply the number of designated mine officials, by the employment of a so-called mine "safety boss." We believe that the appointment of such a safety boss would have the effect of reducing the responsibility of the mine foreman and his assistants, including the firebosses, and would, in many cases, increase the danger arising from the carelessness, recklessness and ignorance of miners.

Safety in mines requires that every mine worker, whether mine official, miner, or mine laborer, should be watchful, not only of his own safety but of that of others. We believe that the work of inspection and the responsibility for the safety of the mine should devolve upon the mine officials mentioned, and that a sufficient number of assistant mine foremen and firebosses should be employed to perform the work required to make the mine safe.

The point we wish to emphasize is that the responsibility for the safety of a mine should rest upon as few individuals as possible. There is then, in case of accident, less chance for shifting the blame. As far as safety in mines is concerned, the multiplicity of mine officials affords an increased opportunity for the application of the old proverb that "What is everybody's business is nobody's business." As a principle, greater safety and efficiency is secured by the concentration of responsibility. We believe this to be a most important principle in mining operations.

Self Ignition of Coal

The opinion of Vivian B. Lewes on the causes of spontaneous combustion appeared in our columns a few weeks ago. He believes that the adsorption of oxygen by the coal substance is sufficient to explain this action. Porter declares in the paper we publish today that perhaps the oxidations of the pyrite and marcasite are also in part to blame. It would be ill-adjudged bravery to deny these views, because facts are few by which they can be met.

We may be pardoned, however, for calling attention to certain weaknesses in

that argument, which declares that the oxygen absorbed by either iron bisulphides or the coal substance is the cause of spontaneous combustion. These difficulties do not by any means completely overthrow the tenet mentioned, but suggest that its confirmation is needed before it can be accepted finally.

Coal when piled, no matter how deep, only slowly becomes heated, yet it will be readily granted as the results of international experiments have shown that the adsorption per unit time declines progressively as time passes; consequently, other things being equal, coal should show a greater tendency to inflame when newly stored.

This argument might be met perhaps by the surmise that while the adsorption of oxygen decreases at uniform temperature, it is nevertheless continuous and increases the heat of the coal, so that the thirst for oxygen remains equal or increases. This surmise would conform to what Mr. Porter concludes, as the result of his experiments that "absorption (of oxygen) increases rapidly as the temperature rises."

It has not yet been determined definitely what happens to the adsorbed oxygen—whether it is merely physically contained in the coal or is combined with it. When the adsorption commences, the action is rapid and the carbon dioxide formed is but a small percentage of the gas which the adsorbed oxygen would form if it were all to act to that end.

Some oxygen may be converted into moisture, and the generated water during exposure does not appear to have been measured. But every indication points out that the transference of oxygen from the air to the coal body has nothing to do with the generation of either the dioxide or moisture. The issuance of the former continues unaffected, neither abated nor increased, as time passes, whereas the adsorption of oxygen falls off considerably after a period of some hours.

As M. J. Taffanel well says: "The oxygen which disappears from a flask (in which coal is confined) is not necessarily really fixed in the coal; a part perhaps is converted into carbonic acid and water. We have not any precise indications of the quantity of water formed which, in all cases, as shown by other experiments, would appear to be of little importance."

It is to be regretted that more discussion is not rife on this elementary subject. It would be easy to ascertain whether coal in nitrogen would emit as much dioxide of carbon, and create as much water as a like quantity of coal would emit in air or oxygen. While it has already been proved that the power of seizing oxygen is not the measure of the power of emitting the carbon dioxide, we do not know if this is true of moisture also. M. J. Taffanel's adsorption sum curve for oxygen and dioxide only covers 150 hours. It certainly should be extended till the curve reaches a point where it is practically parallel with the horizontal axis of coördinates.

The argument we have just elaborated therefore tends to show that the oxygen is merely occluded by the coal in a purely physical manner, that the emission of carbon dioxide is probably like the issuance of methane, due to internal reactions, chemical or biological, with which the environing atmosphere has little or nothing to do, and that the oxygen adsorption is enfeebled by time. Consequently, coal should be less liable to inflame as time passes.

But another consideration also arises which is that evolution of carbon dioxide results during storage. The air in a stock pile becomes largely depleted of oxygen and full of the dioxide and nitrogen. This is amply proved by analysis, so that after awhile there may be a decreased ability to get oxygen even if there be an equal desire to adsorb it.

And if these considerations do not make the accepted view problematic, we have a third difficulty, which is that owing to the lack of good ventilation in the pile, the oxygen is not renewed. It is true that the heat is retained, but if new supplies of oxygen are not provided little heat is generated and there is no need for its removal. On the other hand, if we have ventilation, then the oxygen is renewed and heat developed, but the ventilation cools off the coal by convection of the heated air, so that in either case we have no fire.

According to Mr. Porter's stratum or layer theory, suggested recently, the rain washes down the fine coal to a point a few feet from the surface. The stratum thus formed below is impermeable to air, but under it, there is a body of ventilated coal. The air traveling along the lower surface of the impermeable stratum heats it by oxidation and its impermeability prevents the escape of the heated air. Then obviously the fire starts from the under side of that stratum.

But equally obviously the ventilation of that underside will cool it also. There seems a difficulty in discussing oxidation because it involves ventilation and cooling. This is not the case with hydration. Where ferric hydrates and free sulphur, or sulphur which is held almost as loosely as if free, come together it is not unreasonable to expect heat.

Why is there a delay in spontaneous combustion? First we imagine, because it is necessary to cause the formation of the hydrates of iron. Second, perhaps to cause, by some means, a sufficient heating which will loosen the sulphur in its organic compound. Thirdly, to permit sulphur and iron hydrate to come together and combine.

This is merely a theory, possibly not better than the other, but it seems to match conditions. It will take place readily where there is no ventilation provided. It requires time for action and is more likely to occur after a longer period of storing than a shorter.

This probably explains better than any other theory why coal which has been exposed to the heat due to moisture is least resistant to spontaneous combustion. There is in the humus constituent of such coal probably much organic sulphur, which assists chemical action and promotes the generation of heat.

Some thermochemic considerations of considerable weight, we are not disposed to consider at this time, but it may be stated that there may be and probably are actions which develop more heat than is to be anticipated from the change of pyrites into ferric hydrates and sulphuric acid or by the conversion of the sulphur in the pyrites into sulphurous acid and the iron into one of its oxides or hydrates.

The coal recovered recently from the old battleship "Maine," sunk in Havana harbor for 14 years, has been analyzed by the Bureau of Mines and found to have a heating value on the moisture-, ash- and sulphur-free basis of 15,458 B.t.u. Although the identity of this coal has not been fully established, there are good grounds for supposing that it came from a mine in the New River district, West Virginia. This occurrence should be of interest to those authorities who contend that coal deteriorates rapidly when stored under water.

Inquiries of General Interest

All Questions Must be Accompanied by Name and Address—Not for Publication

Turning Parallel Entries

Please give a general formula for finding how much one entry of a pair must be driven in advance of the other so that when the entries are deflected or turned through any given angle, a required width of pillar will be obtained, either greater or less than the width of the original pillar. Assume that the entries are kept parallel to each other.

MINING ENGINEER.

Pittsburgh, Penn.

Referring to the accompanying figure, four conditions are shown:

1. In the first case, advancing from left to right, the point of deflection in the right-hand entry or air course is behind the point of deflection in the left-hand or main entry, and the entry pillars are of unequal width. In this case, the entries being 10 ft. wide and deflected 30 deg., and the original pillar being 40 ft., while that beyond the turn is 24 ft. wide, making the center lines of the entries 50 and 34 ft. apart, respectively, the difference between the points of deflection is:

Measured on the main entry,

$$\frac{w_1 \cos A - w_2}{\sin A} = \frac{50 \cos 30° - 34}{\sin 30°}$$

$$= \frac{50 \times 0.866 - 34}{0.5} = 18.6 \text{ ft.}$$

Measured on the air course,

$$\frac{w_1 - w_2 \cos A}{\sin A} = \frac{50 - 34 \cos 30°}{\sin 30°}$$

$$= \frac{50 - 34 \times 0.866}{0.5} = 41.1 \text{ ft.}$$

2. In the second case, the point of deflection in the air course is exactly opposite that in the main entry, and the pillars, as before, are of unequal width. In both these cases, the width of pillar beyond the turn is necessarily less than the original width of pillar. When the points of deflection are opposite to each other, $w_2 = w_1 \cos A$. Assuming the same width of entries and original pillar and the same angle of deflection,

$$w_2 = w_1 \cos A = 50 \times \cos 30° = 50 \times 0.866 = 43.3 \text{ ft.}$$

The distance to be measured on the air course beyond the turn is, then,

$$w_1 \sin A = 50 \times \sin 30° = 50 \times 0.5 = 25 \text{ ft.}$$

3. In the third case, the width of pillar is constant, being the same after the turn as before. In this case, it is necessary to measure the same distance on each side of the point of deflection on the air course, in order to square up with the point of deflection on the main entry. Assuming the same original dimensions as before, this distance is

$$\frac{w(1 - \cos A)}{\sin A} = \frac{50(1 - \cos 30°)}{\sin 30°}$$

$$= \frac{50(1 - 0.866)}{0.5} = 13.4 \text{ ft.}$$

4. In the fourth and last case, the pillars are of unequal width, the width of pillar beyond the turn being greater than the original width. Assuming the same original conditions and deflecting 30 deg. as before, the difference between the points of deflection is:

Measured on the main entry,

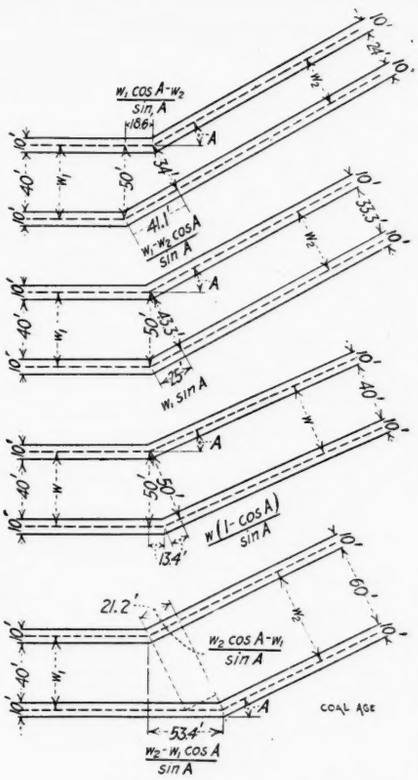
$$\frac{w_2 \cos A - w_1}{\sin A} = \frac{70 \cos 30° - 50}{\sin 30°}$$

$$= \frac{70 \times 0.866 - 50}{0.5} = 21.2 \text{ ft.}$$

Measured on the air course,

$$\frac{w_2 - w_1 \cos A}{\sin A} = \frac{70 - 50 \cos 30°}{\sin 30°}$$

$$= \frac{70 - 50 \times 0.866}{0.5} = 53.4 \text{ ft.}$$



SHOWING FOUR CONDITIONS IN TURNING ENTRIES

Gasoline Engines in Mines

It is desired to locate, temporarily, at a point 2000 ft. underground, a power pump with a 3-in. suction and a 2-in. discharge and to use a 6-hp. gasoline engine to drive this pump. In order to dispose of the gases exhausted by the engine, it is proposed to increase the size of the discharge from the pump to 2½ in., and allow the engine to exhaust into it, so that the exhaust gases may be pumped out of the mine, with the water.

I desire to ask if this can be done successfully, and what additional work will be placed on the engine, by this arrangement? I have done the same thing, successfully, with a steam exhaust, but have had no experience with a gasoline engine.

W. H. HOLLAND, JR.,
Ballinger Coal Co.

Nuttallburg, W. Va.

The exhaust from a steam engine is often turned into the discharge pipe line of a pump, because the steam is at once condensed, in contact with the water. This condensation of the steam in the discharge pipe produces much the same effect as is produced in a condensing engine, reducing the back pressure and increasing the power of the engine. The case of a gas or gasoline engine, however, is quite different, inasmuch as the exhaust gases are not condensed by contact with the water. A portion of the gases may be absorbed by the water; but the absorption does not produce the same depression and reduce the back pressure, as is the case with steam.

We have never seen a gasoline engine made to exhaust into water under pressure, as would be the case if the exhaust were to be conducted into the discharge pipe line of a pump. Such a connection would require a check or foot valve to prevent the water from flooding the pump; and the engine would have to work against the full pressure of the dicharge column. This would greatly increase the load on the engine, but to what extent would depend on the pressure in the pipe line.

COAL AGE would be glad to have this question further discussed by those who may have had experience along this line. Many lives have been sacrificed, from time to time, in the mines, owing to the frequent attempts to introduce this class of motors in mine haulage, and for operaing mine pumps and booster fans. The practice is unsafe and should be heartily discouraged.

Discussion by Readers

Comment, Criticism and Debate upon Previous Articles, and Letters from Practical Men

Avoidable Mine Accidents, A Suggestion

I have been much interested, recently, in studying the different reports of mine inspectors in different states. These reports show that by far the largest number of accidents are caused by the carelessness, recklessness, or lack of knowledge of the party injured, and should be classed as avoidable accidents. The greatest number of accidents, as shown by these reports, are due to rock falls, movement of cars, and lack of experience or knowledge in the handling of machinery.

Owing to the increasing demand for coal and the strong competition in the market, which acts to reduce the price of coal and labor at the mine, good miners are being replaced by a class of foreign labor who are not only ignorant of our language, but understand little or nothing of mining and do not comprehend the dangers by which they are surrounded. Aside from the recklessness and carelessness of the ordinary miner, who has mined coal all his life, it is the ignorance of this class of foreign labor employed that operates most largely to increase the number of accidents in mining.

There is another cause to which I wish to refer, and which is likewise responsible for a large percentage of mine accidents. This is the habit that is common among miners, of continually moving from place to place. Take a miner who has worked successfully and without accident, for a long time, it may be, under conditions where a good roof and coal made it unnecessary to give more than passing attention to the timbering of the airways and working places. As mining conditions change, and this man finds it necessary to move to a new location where the conditions with respect to roof and coal are different and require that much attention be given to the work of timbering, this man, owing to his former experience, neglects the timbering of his place, although he recognizes that it is required.

Again, it may be that he is now working in a place generating gas, to which he is unaccustomed. The mine foreman has much to do to show him how to timber his place and to examine for gas, and to convince him of the danger to which he is exposed if he does not attend to these promptly and make his place safe before going to work.

Almost every mine has a different set of rules and regulations, in regard to the mining and blasting of coal, the use of lamps, handling of powder, supply of timber, etc., etc. When moving to a strange place, it is difficult for the ordinary miner to accustom himself to a new set of rules and conditions different from those with which he has been familiar.

Miners, as a class, are in too big a hurry to load their coal and quite generally disregard any rules or regulations requiring them to examine their place for gas and to test the roof and reset timber that has been thrown out by the coal blasted the night before. It requires the utmost care on the part of the mine foreman and his assistants to prevent miners from working under unsafe roof or in places where gas has accumulated in a pocket of the roof or in the waste, and should be removed before any work is done. It is this utter disregard of mining rules that produces the largest number of accidents.

My suggestion is that each mine having an output of, say, 500 tons of coal a day, should have what I would call a "safety boss." He should be a good practical miner and one who is acquainted with the conditions in that particular seam of coal and understands the best way to timber the roof and coal. He should visit every working place, as far as possible, once or twice a day. He should give his whole attention to examine each place and see that the coal is properly mined and the place safe for work. He should give all necessary instructions to the men, teaching them how to timber and mine their coal and omit unsafe practices that are so common among miners.

In many instances, such a man would save his wages two or three times over, by preventing the waste of timber and rails, which would be covered up by roof falls in a short time and lost but for his inspection. I believe his services would reduce the number of accidents 50 per cent., and perhaps more.

I know it will be claimed that this is work that the mine foreman and his assistants and firebosses should do. It is true that, under the present system, these men are made responsible for the inspection and the safety of the mine; but it is likewise true that their other duties often prevent them from properly attending to the inspection of the working places and the watchful care that is necessary to prevent the bad practices of reckless and ignorant miners. I want to urge all mine superintendents and managers to consider if such a safety boss would not save his wages many times and reduce the accident list.

A. H. DONALDSON.

Porter, Ala.

Relation of Price of Coal to High Cost of Living

In the issue of COAL AGE, Aug. 3, 1912, I read with great interest the Foreword dealing with the low price of coal and drawing attention to the small profits derived from coal mining.

I don't wish to criticize the writer in his remarks, but one item in particular arrested my attention. It was the statement that if the present price of coal was raised a dime or so a ton, it would give a new lease of life to a seriously depressed business.

Having been a miner about 27 years, I have always found that whenever there was an advance in the price of coal, the miner would want an advance in wages which, if conceded, would again take the profits from the operator, and the condition of the business would be as bad as before. If, on the other hand, the miner's demands were not granted, there would generally result a stoppage of the mines, and a serious loss both to the operator and miner. Again, advance the price of coal and the cost of living goes up in proportion, which leaves the miner no better off than before he got the advance in wages.

In my opinion, 75 per cent. of our industrial troubles are caused by the continued advance in the price of food and other necessities of life. Four years ago the miners in our colliery received an advance of 10 per cent. The prices of food stuffs immediately went up 20 per cent., and have since increased 30 per cent. of the former price. No doubt the high cost of living acts as an incentive to the miner to ask for an advance in wages.

I would suggest, as a remedy, that the operators, in self-defense, run general supply and provision stores to compete with or check the advances in the price of living. I believe that if this plan was properly carried out by coal operators on a broad and equitable basis, there would be fewer strikes, which would mean less expense to miners and operators and insure better relations between employer and employed.

FIREBOSS.

Nanaimo, B. C., Canada.

Wilkes-Barre Mining School

The Mining School of the Wilkes-Barre District Mining Institute will open for its fifth year on Oct. 10, 1912. Charles Enzian, of the U. S. Bureau of Mines, will continue as the supervising principal. The other instructors are W. D. Thomas, mine foreman, Kingston Coal Co.; Robert Johnson, mine foreman, L. V. C. Co.; J. F. Lessig, mechanical engineering department, L. & W. B. C. Co., and E. C. Lee, mining engineering department, L. V. C. Co.

The course of instruction includes work in arithmetic, mine gases, mine surveying, mine ventilation, mine law, electricity and magnetism, mechanics, air compression, timbering, trackwork, haulage, pumping, hoisting, drainage, steam and steam boilers, and the preparation of anthracite.

The Wilkes-Barre institute school has a three-year course, planned to prepare mining men for positions they may occupy in connection with the mining industry, and to fit them for promotion and advancement when the opportunity presents itself.

The fees for this course are $8 for the term from October to April. To those students who complete the entire three years' course and pass a satisfactory examination, this fee is refunded.

Sociological Notes

In Great Britain, France, Austria, Belgium, Holland and Russia the maintenance of mine-rescue stations is demanded by law. British Columbia compels the keeping of breathing apparatus at all coal mines.

The H. C. Frick Coke Co., of Penn., has inaugurated a campaign to reduce accidents in their mines and workings. All men seeking employment are warned that carelessness will not be tolerated. Illuminated, two-faced safety signs have been installed in the mines and on the surface. The rules of the company, printed in five or more languages, are posted in all waiting rooms, lamp houses and at the top and bottom of all shafts. Dangerous parts of mines are placarded, and signs, similar to guide posts on country roads, are erected throughout the mine, so as to render escape easy in case of accident and consequent confusion and haste.

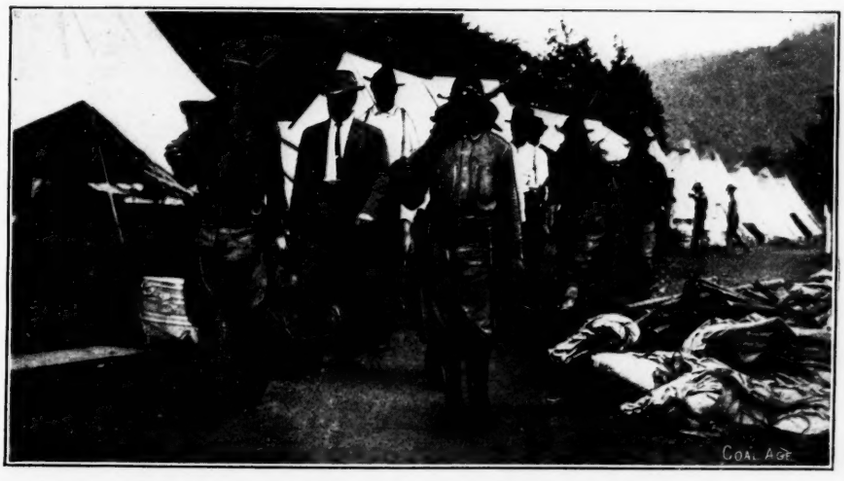
The British Royal Commission of Mines recommends that men be not allowed to pass or work in places where more than 2½ per cent. of gas is present. Rescue work in English mines is compulsory. Mines employing less than 250 men must maintain one rescue corps. If more than 250 men and less than 500 are employed, two corps must be maintained. If more than 500, but less than 800 men are in the workings, three corps are mandatory, while the employment of more than 800 men calls for four rescue corps. Each corps is provided with two sets of breathing apparatus, two small mice or birds for carbon monoxide tests, two electric hand lamps and one safety lamp for each member of the corps. All central rescue stations must be equipped with at least 15 complete sets of rescue apparatus, with sufficient oxygen to last for two days, 20 electric hand lamps, first-aid-to-the-injured kits, fresh drinking water, 4 oxygen pulmotors and birds and mice. Each mine must be provided with a motor car for quick action in case of accident.

Scenes at W. Va. Strike

GOV. GLASSCOCK'S INVESTIGATING COMMITTEE

From left to right: Ex-State Senator F. L. Blue, Bishop C. J. Donohue and Capt. Walker. The man on the extreme right is Capt. Sherwood, Secy. of the Commission.

GEN. ELLIOT, PRES. CAIRNS AND TREAS. DIAMOND OF THE MINERS' UNION



MILITIAMEN ESCORTING PRISONERS TO COURT MARTIAL IN ONE CAMP WHERE MARTIAL LAW HAS BEEN DECLARED

Examination Questions

Selected from State Examinations, or Suggested by Correspondents

Firebosses' Examination

(Selected Questions)

Ques.—If you were in charge of a mine that was naturally dry and dusty and liberated explosive gases, state, in general, how you would reduce the dangers of the same to a minimum and provide the greatest safety to the workmen under your charge.

Ans.—Study carefully the conditions in the mine. Make and enforce strict regulations in reference to the cleaning up of the working faces and preventing any accumulation of dust there or on the roadways. Where blasting is performed permit no shots to be fired, except such as have been properly examined and permission given to fire the same. The working face and all approaches to the same should be thoroughly sprinkled for a distance of at least 20 yd. from the shot, before the same is fired. See that proper warning is given to the workmen in adjoining places. If necessary for safety, have all shots fired by competent shot firers, after the men have left the mine.

Test the working face for gas before firing a shot. Use every precaution to prevent the ignition of gas, dust, or powder. To this end, see that all brattices are in position and that the air current sweeps the working faces with a velocity sufficient to remove any accumulations of gas from cavities in the roof or other void places.

Permit no more powder to be taken into the mines, by any person, than what is needed for the day's use, and require this to be carried in a closed canister. Require the use of copper-tipped tamping bars. If safety lamps are required, forbid the use of mixed lights.

Ques.—Describe the principle of the safety lamp, and explain how it is that the wire gauze of the lamp allows the passage of air and gas but prevents the passage of flame.

Ans.—Briefly stated, the principle of the safety lamp is as follows: The mixture of gas and air burning within the lamp, when passing out through the gauze is broken up into numerous small streamlets of gas-laden air. The gas is thus brought into close proximity to the cool metal of the gauze, and its temperature thereby reduced below the point required for combustion, the heat being conveyed away through the metal of the gauze. As long as the metal remains cool, the flame of the burning gas will be extinguished in close proximity to it.

FIG. 1. FLAME CANNOT TOUCH A COOL METAL SURFACE

Fig. 1 illustrates how it is impossible for a flame to touch a cool metal surface. The cooling effect of the metal kills the flame in proximity to its surface. This is a simple experiment that can be tried by any one.

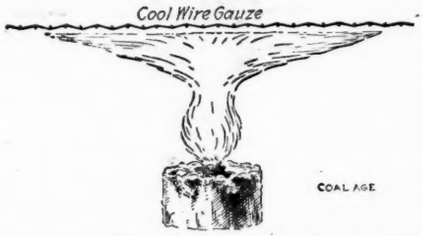


FIG. 2. SHOWING EFFECT OF WIRE GAUZE ON FLAME

Fig. 2 shows how a piece of wire gauze depressed on the flame of a candle, flattens out the flame, which plays underneath the gauze, while the hot air and gases pass up through the mesh.

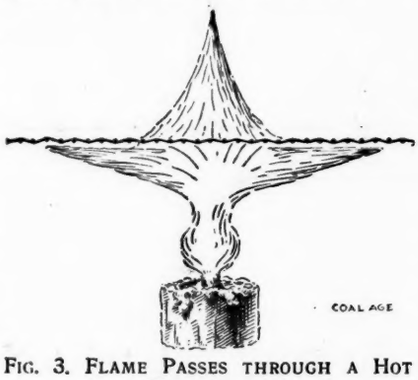


FIG. 3. FLAME PASSES THROUGH A HOT WIRE GAUZE

Fig. 3 shows what happens when the gauze has become heated so that its temperature is equal to that required for the combustion of the gas. The metal now no longer conveys the heat away, but the temperature of the burning gases is maintained, and as a result the flame passes through the gauze, the gases continuing to burn above its surface. This condition obtains when a safety lamp is exposed too long to an inflammable mixture of gas and air. The gauze becomes heated by the burning gas within the lamp and suddenly transmits the flame to the outside atmosphere.

Ques.—What effect has an atmosphere mixed with explosive gas on the flame of a safety lamp?

Ans.—If the gas is present in sufficient proportion, the flame of the lamp is first slightly lengthened, and then increases in volume or size. When the firedamp mixture approaches the maximum explosive point, the flame becomes unsteady. As the volume of the flame increases, the lamp often fills with a pale blue flame, in which case it should be promptly removed from the gas. When the gas is particularly sharp, or when olefiant gas is present in sufficient proportion, the flame may crackle and slight explosions may occur in the lamp, which is a warning to withdraw the lamp promptly but not too quickly from the gas.

Ques.—Explain the effect of a dusty atmosphere on the flame of a lamp.

Ans.—The fine dust of an inflammable coal suspended in the atmosphere has the same effect as inflammable gas on the flame of the safety lamp, but to a less degree. The flame distills carbon monoxide gas (CO) from the dust and this gas lengthens the flame, causing it to reach upward in a slim taper blaze, the flame at the same time becoming somewhat more dense and brighter.

Ques.—If an abandoned part of a mine contained accumulations of explosive gas, what method would you adopt to render the gas harmless and keep the mine in a safe condition?

Ans.—All abandoned places where gas accumulates in explosive proportions should be ventilated in a manner that will prevent such an accumulation of gas. If it is impracticable to do this, the place should be sealed off by closing all the entrances to the same with substantial stoppings, which should be made airtight. Pipes with cocks should be built into the stoppings to allow samples of the gas to be drawn, from time to time, and examined. Provision should also be made for the escape of any water that may accumulate behind the stoppings.

Coal and Coke News

From Our Own Representatives in Various Important Mining Centers

Washington, D. C.

The Department of State has recently received from the American Consul at Montevideo, Uruguay, a report published in *El Dia,* the official organ of that government, regarding the grade of American coal supplied last spring by American dealers to the Uruguayan Government.

Particular importance attaches to this report, inasmuch as this is the first sale of American coal to the Uruguayan Government and practically the first important sale in that part of South America. The department looks upon this sale as an entering wedge in a lucrative market for American coal operators. Heretofore English coal has had a monopoly of this market.

The report of the Uruguayan Government engineers on American coal is as follows:

"As will be remembered, the government some time ago determined on the purchase of a large quantity of coal in the United States, it having been considered advisable in the interests of the state after the Minister for Public Works had reported the status of affairs.

"At the time, charges were made that such purchase was disadvantageous and ill-advised, as American coal was of an inferior quality and its price excessive. These charges have been absolutely disproved by the practical tests to which this cargo was put. Reports have been submitted for the Montevideo Electric Power Station (government-owned), by Engineer Juan Smith and the Chief Expert of the Ministry stores, with special reference to its utility and cost.

"These tests show that the coal acquired directly by the government is of the first-class, and that it is successfully used by vessels and factories in the United States. It must be acknowledged, however, that it has the defect of being brittle, that is to say, not very cohesive, and this may lead to some loss until the firemen have become familiar with the way to use it.

"As regards this purchase, the state has made a saving over the present price of coal of about $1.70 per ton, with a total saving of not less than $8759. And if one takes into consideration the high price demanded at the time of this purchase, American coal being then sold in this market at $15.60 per ton, due to the coal strike, the saving can be calculated which would have been made had the strike continued.

"In view of the good results obtained, the government will continue to buy coal direct, taking the precautions necessary to avoid or lessen the expenditures which have been so high for lighterage, storage, etc., as regards this shipment.

"In the report made by Engineer Smith, referred to above, details are set forth as to the properties of the coal and the results obtained in various tests, during which 14,500 kilos were consumed in eight hours. The conclusion reached is that its industrial utility is equivalent to Cardiff coal of the quality used by the central generator in the power house, the result being identical with the average standards of the fiscal year. With regard to the heating potentiality, the same report says that it was the same and at times greater than the Cardiff.

"As to price, this trial shipment came out at exactly $9.66, according to the detailed report of the chief of the Ministry stores, including $24,715 for freight, lighterage, storage and other expenses.

"In conclusion and to give an exact idea of the advantage of this good and low-priced coal, it suffices to know that today, not including the large dredging works shortly to be industrially prosecuted, the Ministry of Public Works alone consumes about 16,500 tons of coal a year, and the saving of only one peso a ton would amount to a large figure—perhaps large enough to warrant building a small bridge or a couple of kilometers of highway so greatly needed and demanded in our rural districts."

The reconvening of the Interstate Commerce Commission shortly to occur. as members are now rapidly returning to Washington, and the resumption of sessions by the Supreme Court in the near future is expected to result within a brief time in a number of important decisions affecting the coal industry.

Among these are determinations of several significant rate cases left over from last spring; while there are pending in the Supreme Court decisions on matters affecting the coal situation both directly and indirectly.

The Louisville & Nashville rate case, which dealt with one of the coal episodes in which Judge R. W. Archbald was involved, will be one of the matters to be disposed of early in the section. The Interstate Commerce Commission has before it several cases involving important rates and practices relating to the movement of both soft coal and anthracite.

Secretary of the Interior Fisher has at length taken final action disallowing the Cunningham, Alaska, coal claims, which constituted the principal issues between Secretary Ballinger and former Chief Forester Gifford Pinchot and lay at the root of the lengthy Ballinger-Pinchot investigation.

This ultimate decision had long been expected, all the preliminary indications having pointed unmistakeably in that direction. Therefore, the outcome now arrived at has been predicted for a great while. It does not materially alter anything, but it still leaves open, in an even more evident way than heretofore, the fundamental question how land is to be taken up in Alaska, and calls emphatically for legislation on the part of Congress.

Mr. Fisher will again recommend legislation at the coming session of Congress, and President Taft will support him in so doing, it is understood.

The Cunningham claims had an area of 5250 acres. It has been alleged that they possessed an enormous intrinsic value and that the so-called Morgan-Guggenheim syndicate was really the power behind the men who technically claimed the lands.

The action now at length confirmed by Mr. Fisher restores the lands to the public domain, while about $53,000, which was paid to the government under the law by the claimants, is retained by the treasury. The claimants will have to secure an act of legislation from Congress if they desire to recover these deposits. It is believed that they will not be willing to reopen this old controversy.

Alabama

Tuscaloosa—A tentative agreement has been made for the organization of a $1,000,000 company to develop 4000 acres of coal land in the Warrior River field near Tuscaloosa.

Gadsden—A representative of the North Alabama Coal, Iron & R.R. Co. which has just taken over the Hammond mines, near the Southern Depot, announces that double shift will be placed at work. New equipment may be added in the near future.

Arkansas

Portsmouth—More than a dozen big coal mines in Arkansas will resume operation this week. These mines have been closed because the operators and

miners could not agree upon a scale for machines to be used in mining coal. More than 2000 men will begin work. Throughout the coal fields in western Arkansas operations are being resumed on full time.

Illinois

Decatur—The Wabash R.R. Co. has purchased an option on 15,000 acres of coal rights in Christian County, one of the largest coal-producing counties in the state.

Peoria—Articles of incorporation were filed at the county recorder's office, Sept. 7, for the Olympia Coal Mining Co., of Peoria. The capital stock is $100,000. The headquarters will be at Peoria, and the object of the concern is to mine, wholesale and retail coal.

Pana—Almost a thousand miners employed in the four coal mines at Pana, one of the largest mining towns of the state, went on strike on orders from a sub-district official who states that operators are not keeping their part of the agreement recently made.

Rockford—A formidable array of witnessess from Rockford were expected to give testimony in Chicago, Sept. 5, at a meeting of the Illinois Railroad & Warehouse Commissioners concerning a reduction of rates on coal to this city from central and southern Illinois points.

Indiana

Gary—Articles of incorporation have been filed with the Secretary of State for the O'Donnell Coal Co., $5000 capital stock.

Brazil—The whole force of 250 miners have quit work at Miami, Mine No. 4, west of this city, because of the failure of the company to remove water from two entries. The company has had trouble removing the water for several months. It is believed, however, that the water will be pumped out quickly, and the strike will be of short duration.

Iowa

Oskaloosa—The very latest coal enterprise in the big Black Diamond field of Marion County is a 60-ft. shaft on the Vergin Roberts place in East Knoxville township. The newly opened mine exposed an 8-ft. vein of coal, which is supposed to be a continuous thick seam over an area of over 5000 acres.

Des Moines—The mines in the Des Moines district are showing renewed activity. The force of miners has been increased at every mine, and it is expected that within another week the operators will have a complete force on full time.

Michigan

Kerby—The coal mine between Corunna and Kerby, which has been idle for the last two years, has been leased to a newly organized company composed of miners, most of whom reside in Corunna and vicinity.

Minnesota

Biwabik—The three men imprisoned in the Ruddy mine undoubtedly are dead. It was thought that they were in the sub-level above the water, but when workmen reached that depth the men were not there. They are on a lower level, and it is thought they are covered with six or eight feet of water. The mine was flooded by a cloudburst.

Colorado

Denver—Colorado coal production for the first half of 1912 amounted to 5,265,691 tons, an increase of 743,045 tons over last year in the same period. The value was $14,000,000, an increase of $2,000,000.

Colorado Springs—One hundred and ninety-four thousand seven hundred and six tons of coal, an increase of twelve thousand four hundred and seventy-eight tons over last year for the same period was the output of the El Paso County coal mines for the first seven months of this year, according to the report compiled by James Dalrymple, State Coal Mine Inspector.

Denver—Las Animas is the champion coal-producing county of Colorado. For the first seven months of 1912 its production was 2,779,946 tons. The closest competitor was Huerfano County with a production of 1,020,603 tons.

Two suits were brought in the United States District Court, Sept. 6, by the government in an effort to recover valuable mineral and grazing land alleged to have been filed on fraudulently ten years ago.

Ohio

Steubenville—Fire originating in the wash room at the foot of the air shaft in the Y. and O. coal mine at Amsterdam, Sept. 9, started a serious blaze. The miners fled immediately, but for a time it was believed that five men had been suffocated. Later these men reached the surface through an emergency shaft.

Pennsylvania

Anthracite

Philadelphia—Officials of the big coal companies say that many of the miners who stopped work on Apr. 1 have not returned to their places, and that because of the lack of labor, anthracite production will fall short about 5,000,000 tons, despite the gain now being made in production.

Pottsville—The Lehigh Coal & Navigation Co. has satisfied a mortgage for $15,000,000 with Recorder Samuel S. Bailey. The mortgage covered a bond issue floated in 1871 with the Fidelity Insurance & Safe Deposit Co., of Philadelphia. The magnitude of the mortgage is indicated by the fact that it was covered with $4000 internal revenue stamps.

Despite the heavy coal traffic of last year, which the Reading Co. handled in preparation for a strike in the spring of this year, the company during the month of August had one of the greatest increases in the amount of coal handled that has been noted in years. In August, 1911, the company handled 569,000 tons of coal. During the same month of the present year it handled 769,000 tons. Hauling 50 tons to a car, the company would require 15,380 cars to handle this amount of coal.

Scranton—A settling of the surface, due to a squeeze in the top vein, has damaged the Johnson breaker of the Green Ridge Coal Co., Jefferson Ave. and Poplar St., sufficient to force it to close down for repairs. The officials say the settling of from three to six inches has not affected any but their own property.

Bituminous

Uniontown—The Poland Coal Co. is now making preparations for the development of the tract of 600 acres recently acquired at the mouth of Dunkard Creek, on the Monongahela near Lock No. 8.

Somerset—Judge Ruppel recently granted a temporary injunction restraining the United Coal Co. from building a dam across Quemahoning Creek. It was alleged that such a dam would flood valuable farm lands.

Connellsville—The Stoner Coal Co. expect to begin operating a drift mine at Alverton in three weeks. Equipment is being installed.

Mt. Pleasant—Many miners were imperiled and the Acme workings of the W. J. Rainey interest at Mt. Pleasant were flooded in a storm, Sept. 7. Almost without warning a tremendous volume of water rushed into the Acme shaft. Men in the workings were warned and escaped with difficulty.

Elizabeth—A few years ago, John Collier, a Pittsburgh real-estate dealer, took option on the 4-ft. seam of coal in the district between the Monongahela and Youghiogheny rivers. This district comprised between 1200 and 1500 acres, and is principally in Forward Township. Mr. Collier has recently reported to some owners of the coal, that he has a sale of it practically made, and expects to have the deal completed in the next few months.

Washington—The Anderson Coal Co., of Pittsburgh, has recently purchased 675 acres of coal land in Hazel Township for $223,038. It is understood that the company plans immediate development of the coal. The transfer is one of the largest ever made in that part of Washington County.

Upon the petition of E. C. Kurtz, receiver for the Washington County Coal Co., the auction sale of said company's

property was postponed until Oct. 2, at 1:30 o'clock. At the sale, which took place, Aug. 15, 1912, the highest bid received for the property was $45,000, which was considered inadequate, and the sale was adjourned to the date above mentioned.

Pittsburgh—Owing to the flooded condition of the Pittsburgh district coal field, very few mines are able to get out their normal tonnage. In the Panhandle regions, some of the larger mines are entirely out of commission, while deliveries are being urged for with increasing anxiety by the buyers.

There is an increasing demand for Connellsville coke, due to the increasing volume of iron and steel business in the country, and the operators are trying to keep pace with the stride of the consumer. An indication of this condition is found in the firing up of some 600 ovens last week. Of these 400 were merchant ovens, and 200 furnace ovens.

Connellsville—It was announced, Sept. 11, that the Cook heirs intend to incorporate a company for the development of their land in Somerset County, which, for the most part, consists of fireclay, coal and timber along the line of the new Western Maryland Ry.

The Continental Trust Co., acting as trustee in the case of the Baltimore Security Co. against the Cumberland Basin Coal Co., sold the coal company's entire property at public auction, Sept. 11, for the sum of $200,000. The property consists of over 5000 acres of coal land in Allegheny County, Md., and Somerset County, Penn., three miles of railroad, 54 company houses, power house, mine buildings, extensive equipment and timber.

The H. C. Frick Coke Co. is making extensive alterations at the Lemont, Youngstown and Coalbrook mines to prevent damage by flood. Similar improvements are being made at the mines of the Superba Coal Co. at Evan's Station, while other improvements at mines in the Connellsville region are planned. All openings at the two Lemont and Youngstown mines are being raised five feet above the highest water mark recorded in the flood of July.

Tennessee

Bristol—Southwest Virginia operators are making a vigorous fight against the petition of the Louisville & Nashville R.R., asking for an advance of 30c. per ton on coal moving to Central Western points. The coal operators say that the proposed advance will practically cut southwest Virginia coal out of this big territory. While the bulk of this coal is now moved to Tennessee, Georgia and the Carolinas, a big business has been built up in Kentucky and other states which the advance would cripple if not altogether destroy.

Knoxville—Arrangements for the field day of first-aid contests to be held at Knoxville, Tenn., on Oct. 26, have been practically completed by committees representing the Appalachian Coal Operators' Association and the Tennessee Society of Mine Foremen. This will be the first affair of the kind ever projected in east Tennessee and will be patterned after that recently held at Pineville, Ky. The program of exercises for the field day will be announced shortly. Prominent mining and engineering experts are to give addresses on the day of the contests, while other features have been provided for. The quarterly meeting of the Appalachian Coal Operators' Association, which was scheduled for September, has been postponed to the day of the field-day exercises in order that all of the operators from Kentucky and Tennessee may be present at both. All of the mines in and around Knoxville will be closed for the day. Gold medals will be offered for the winners in the first-aid contests.

Nashville—The hearing of the coal-rate case will begin in this city shortly and will last several days. Special Examiner Boyle, of the Interstate Commerce Commission, will preside. The case involves the efforts of Nashville commercial organizations to have the present rate of $1 a ton on coal reduced to 50c. on shipments from western Kentucky points.

Kentucky

Lexington—That Pennsylvania capitalists are making an effort to gain ownership or control of hundreds of thousands of acres of eastern Kentucky coal and timber land in anticipation of a tremendous increase in the value of those lands within a comparatively few years, when the Pennsylvania coal fields will, according to experts, be almost worked out, are revealed by the operation of the five biggest coal-land companies. Five companies concerned in this work are controlled by the same set of capitalists of Johnstown, Penn., and Wilmington, Del.

Henderson—The Keystone Mines, which have been idle for the past two years, have been leased by the M. M. Moser Mine & Mining Co. and will be put into operation at once. The mine already is equipped with modern machinery and few changes will be made. The mines are some of the largest in that section of Kentucky, having a daily capacity of 1500 tons. M. M. Moser is president and general manager of the company.

West Virginia

STRIKE SITUATION

The interest in the West Virginia coal mines this week centered in the strike situation of the Kanawha district, a short chronology of which is herewith submitted:

Sept. 7. State troops prevented the meeting of the miners on the capital grounds tonight.

Frank Hayes, vice-president of the United Mine Workers of America, today took charge of the strike of the miners in the Kanawha district.

Major James I. Pratt, commanding the state troops, reports renewal of hosilities near Oakley.

Sept. 10. "Mother" Jones announced today that the striking miners of the Kanawha district would make another effort to see their governor.

Work was resumed in many mines in the West Virginia trouble zone this morning.

The scope of the martial-law zone in the Kanawha valley coal field was extended today.

Mine guard fined $1000 and sentenced to one year in the penitentiary for carrying concealed weapons.

Hearings before the Comimssion will begin tomorrow.

Sept. 11. A reward of $2500 has been offered for the arrest and conviction of the men who killed mine guards, R. S. Springer and Gus Pinson.

Fifty miners who had remained at work in the mines at Kingston struck today.

Private Long, who shot and killed Samuel Aultman, a miner, was today acquitted of the charge of murder.

Sept. 12. It is rumored that two mine guards have been slain and a third badly beaten.

More men are returning to work under the same conditions that existed before the men were called out, but an effort is being made to bring out miners outside the military zone.

Sept. 13. Buildings of some of the coal companies destroyed by fire or dynamite today.

Sept. 14. Military outposts were fired upon during the early hours today at Holley. They replied, and for a time the exchange of shots was brisk.

Alaska

Three hundred of the eleven hundred coal claims in Alaska have been canceled by the general land office. The charge in the greater number of the cases was that the application had not been made in the time set by law. Four claims in the Rathbone group were canceled because, it is claimed, the locations were not made in good faith, but in the interests of certain wealthy men of Portland, Ore. No reply was made to the charge. Forty-three claims in the Watson group have been canceled. Frank Watson, the promoter of this group, was indicted at Chicago in March, 1911, for conspiracy to defraud the government. Charges of fraud or failure to apply for patent are pending against practically all of the Alaska coal claims not already canceled. Only 32 claims in Matanuska now remain uncanceled.

Construction News

Helena Station, Ala.—The Conners-Weyman Steel Co., office Brown-Marx Building, Birmingham, is opening a coal mine in the Helena Seam, on the Birmingham Mineral Branch of the Louisville & Nashville R.R., near Helena Station.

Empire, Ala.—A contract has been let to the Furtwangler Construction Co., of Birmingham, for grading the six miles of railroad to connect the Frisco R.R., at Empire, with the new operation being opened by the Maryland Coal Co. of Birmingham.

Coal City, Ala.—The Mitchell Mountain Coal & Iron Co., a new corporation, with headquarters at Atlanta, Ga., are opening up a large brown ore pit six miles from Coal City. A railroad connection four miles long is being graded to it from the Seaboard Air Line Ry. at a point two mile from Coal City.

Litchfield, Ill.—Appropriations for the erection of ten coaling stations, each to cost about $10,000, have been made by the Wabash receivers. Appropriations have also been made for the erection of a number of 100,000-gal. water tanks. The exact location of these new coaling stations and of the new water tanks is not yet certain.

Brownsville, Pa.—Work on the 50,000,000-gal. reservoir at the Allison Works of the W. J. Rainey Coke Co. will start at once. F. J. Foye, of South Brownsville, has been awarded the contract The dam will contain 5000 cu.yds. of concrete, and more than 30,000 cu. yds. of excavation will be necessary. A 220-ft. earth fill will be placed against the back of the dam to reinforce it The retaining wall will be about 200 ft. long and 45 ft. high.

Hillsboro, Ill.—The big new million dollar coal smelter of the American Zinc, Lead & Smelting Co., is about completed and it is expected that it will go into commission within a week or two. Concentrates are now being shipped to Hillsboro to supply the new smelter.

At the Tennessee property, the foundations are in for the new 1000-ton mill, but it will take the balance of the year to complete this plant, and by the time of completion the mine will be in shape to meet the mill requirements.

In the meantime, the company is showing earnings of about $50,000 per month from its present operations.

Birmingham, Ala.—The Tennessee Coal Iron & R.R. Co., has commenced hoisting coal from the main hoisting shaft at its new Edgewater Mine in the Pratt seam of coal, all the hoisting and shaft bottom equipment being finished. This nearly completes the construction work at this plant, which is one of the most modern coal operations in the South.

The company is now moving the equipment on the ground preparatory to beginning the sinking of No. 16 Pratt Shaft in the Pratt seam of coal about three miles north of Edgewater mine on the Birmingham Southern Railroad. This will be a shaft operation about 200 ft. deep, and will also be modern in every respect. A town will also be built by the company at this point which will be called Bayview, being located on one edge of their large reservoir recently completed.

The construction work on the 280 Koppers byproduct coke ovens of the Tennessee Coal Iron & R.R. Co., is now completed, except some cleaning up around the plant, and the finishing up of the safety devices and appliances, and the whole plant is now in full operation.

Publications Received

ANNUAL REPORT OF THE DEPARTMENT OF MINES OF WEST VIRGINIA for the fiscal year ending June 30, 1911.

OFFICIAL REGISTER OF HARVARD UNIVERSITY. Graduate Schools of Applied Science, School of Mining. 5½x8 in., 53 pp.

FIRST ANNUAL REPORT OF THE DIRECTOR OF THE BUREAU OF MINES. For the Fiscal Year Ending June 30, 1911.

THE TRANSMISSION OF HEAT INTO STEAM BOILERS. By Henry Kreisinger and W. T. Ray. Bulletin No. 18, U. S. Bureau of Mines.

MAGAZINES AND THAW HOUSES FOR EXPLOSIVES. By Clarence Hall and S. T. Howell. Technical paper No. 18, U. S. Bureau of Mines.

THE EFFECT OF STEMMING ON THE EFFICIENCY OF EXPLOSIVES. By W. O. Selling and Clarence Hall. Technical paper No. 17, U. S. Bureau of Mines.

THE SELECTION OF A BOILER FEED WATER. By J. C. William Greth. Reprinted from Proceedings of Engineers Society of Western Pennsylvania. Vol. 26, May, 1910. 15 pp., 6¼x9¼ in.; illus. Compliments of Wm. B. Scaife & Sons Co., Pittsburgh.

Industrial News

The Louisville & Nashville R.R. have also awarded a contract to the Roberts & Schaefer Co. for designing and building a 400-ton frame constructed, counterbalanced bucket coaling station for installation on their line at Livingston, Ky.

This company have also recently secured a contract for a large complete coal mining plant for the Calgary Coal Syndicate at Mitford, Alberta, Canada.

The Robert & Schaefer Co., engineers and contractors, McCormick Building, Chicago, have ordered a contract by Curtis Dougherty, chief engineer of the Queen & Crescent route, Cincinnati, O., for a 500-ton reinforced concrete Holman counterbalanced bucket locomotive coaling station for installation at Ludlow, Ky.

The Roberts & Schaefer Co., Engineers and Contractors, McCormick Bldg., Chicago, have just been awarded a contract by Curtis Dougherty, Chief Engineer of the Queen & Crescent Route, Cincinnati, O., for a 500-ton reinforced concrete Holmen counterbalanced bucket locomotive coaling station for installation at Ludlow, Ky.

This will be the third Holmen plant of this capacity that has been built by the above company for the Queen & Crescent Route. Contract price is $17,500.00.

Two New York inventors proposed to mine all coal in the form of dust with a specially constructed machine, mixing it at once with water and handling it thereafter by pumping through pipes. At its destination it will be separated from the water and dried, and can be then used for all purposes for which lump coal is now employed.

This machine, primarily designed to cut the whole seam of coal into a granular or powdered state, has been tested and, according to engineers who have designed it, has proved itself so economical in operation that they say it may change the whole art of mining and transporting the consuming coal.

The idea is not new, but has never been considered practicable. If, therefore, Hoadley and Knight can put it into practical operation, a slight revolution may result.

Trade Catalogs

The J-M Salesman. Published by the H. W. Johns-Manville Co., Cleveland, Ohio. 6x9 in. 8 pp., illus.

Catalog of Lucas Steel Chain Tapes. Published by the J. C. Elmer Co., manufacturer, Cleveland, Ohio. Bulletin No. 101. 6x9 in. 8 pp., illus.

Testimonial Catalog. Published by the William Cotton Crusher & Pulverizer Co. 6x9 in. 200 pp. An interesting and well gotten up catalog. Illus.

Personals

George Gordon Crawford, president of the Tennessee Coal, Iron & R.R. Co., spent last week in New York attending meetings of officials of the subsidiary companies of the United States Steel Corporation.

Daniel E. Reagan, president of the Hocking Valley Products Co., has returned from an inspection trip in the company's properties in the Hocking Valley coal fields, whose mines are being operated to their full capacity, and taking the car shortage into consideration are in good condition. The brick plants of the company are also in full operation.

M. M. Bardwell, general manager of the North Jellico Coal Co., who has been ill for the past five months, will shortly leave for Chicago to undergo special treatment by a specialist. Mr. Bardwell's ailment has baffled physicians who have attended him. He is suffering from a fever believed to result from an affection of the heart. He failed to gain relief from a six weeks' sojourn at the John Hopkins Hospital at Baltimore, Md.

R. R. Williams, superintendent of the Imperial coal mines at St. Charles, Va., who was shot in the head by a discharged laborer recently, has shown improvement following an operation by physicians who were hurried to the scene. The bullet removed from the mine superintendent's head was pressing on the brain, causing temporary paralysis and unconsciousness. Mr. Williams regained his senses shortly after the operation and is believed to be out of danger. The laborer was instantly killed in the duel by the superintendent.

Obituary

James Terry Gardiner, president and director of several coal companies, died Tuesday at his summer home at Northeast Harbor, Maine, after a brief illness. He was born in Troy, N. Y., in 1842, and graduated from the Rensselaer Polytechnic Institute and the Sheffield Scientific School. During the years 1863 and 1864 he was engaged in constructing earth works about San Francisco. Since that time he either assisted in or headed many state and government surveys.

Mr. Gardiner was president and director of the Mexican Coal & Coke Co., the Coahuila Coal Ry., the Northeast Harbor Water Co., and a director of the Pennsylvania Beech Creek & Eastern Coal Co.

Coal Trade Reviews

Current Prices of Coal and Coke and Market Conditions in the Important Centers

General Review

The fall demand for anthracite has now opened up and numerous inquiries are coming in, while dealers are finding it easier to sell coal than to obtain it. The premiums asked in the retail trade have reached a point where they are prohibitive. The clearer weather has aided the coastwise movement, but the scarcity at the terminals makes the loading slow. It is reported that many towns have scarcely any hard coal and when the cold weather appears the situation is liable to be critical.

Coastwise bituminous prices are up and there is detention at all the piers because of the shortage of coal. Shippers are going slow on new business and the output is only about equal to the contract demand. The West is absorbing an unusually large percentage of the West Virginia product, because of the anthracite shortage, and the prospects appear good for another period of high prices.

The heavy Eastern demand at the present time is ascribed, partly, to the fact that consumers are realizing the possibility of a shortage, and partly to a lack of sufficient equipment for loading. Even at the new high prices, it is difficult to procure any large tonnages ahead. Every effort is being made in the Pittsburgh district to increase the Lake movement, which continues rather slow; the West Virginia labor trouble is also throwing an additional demand on the Pennsylvania operators.

The inadequate car service in Ohio is still curtailing the production there. Orders are coming in rapidly and operators and jobbers have all the business they can handle; the Lake movement is good, but would be better were it not for the car shortage.

The continued heavy demand and limited supply at Hampton Roads has resulted in an advance in the schedule. There is considerable spot business, of which the operators are unable to take advantage, and there is no evading the fact that there is a perceptible shortage. The car situation at this point is fair, which is probably due to the labor troubles in the Paint Creek region. Quotations in the southern market have not advanced, but are firmer than for some time, and the present production is obviously inadequate.

The Middle Western market is quite brisk and a sharp advance is being freely predicted. There is a large demand for every pound of soft coal arriving and there appears to be small chance for accumulating any reserve. At St. Louis the market is steadily advancing, especially on the higher grades, and some operators are sold up for a month ahead. It is impossible to get anthracite at that point, except at a premium, and there are prospects of a 50 per cent. shortage at Chicago.

Boston, Mass.

Bituminous prices are up, especially for Hampton Roads delivery. The market for Western shipment is so strong for prepared coal that Pocahontas and New River, with but few exceptions, are now being held at from $2.90@3 f.o.b. loading port, with slow loading at that. There is detention at all the piers on account of a shortage of coal, and already there is inquiry for Pennsylvania grades for offshore shipment. With the anthracite shortage, the West is likely to absorb a very large tonnage from the West Virginia districts and the prospect is good for another period of high prices and one that will last well into next year. Pennsylvania grades will also move up in sympathy and a quite active demand is looked for soon.

Georges Creek and the best grades from Cambria and Somerset are beginning to be in short supply. Shippers are going slow on new business and the output is not much above what contracts call for. All-rail there is a strong demand, but not as yet of any speculative turn.

On anthracite the premiums asked have reached a point where they are prohibitive, at least so long as present retail prices prevail. The dealers, therefore, are waiting to see what is the next move; $6.75 is about the price asked for egg, stove and chestnut, alongside Boston, or an even dollar in advance of the net circular of the companies. Shipments are still being received in fair volume from some of the companies, but decidedly more comes from Philadelphia than from New York. Chestnut is the only size of which there seems to be even a moderate supply. Clearer weather along the coast has helped the movement of tonnage, but on the other hand the scarcity at the terminals makes the loading slower. The first taste of cold weather will surely start something in anthracite throughout New England. There are many towns that have absolutely no hard coal on hand, and the number of dealers temporarily out of business is probably increasing every day.

Current wholesale prices are about as follows:

Clearfields, f.o.b. mine	$1.10 @ 1.35
Clearfields, f.o.b. Philadelphia	2.35 @ 2.60
Cambria County, Miller Vein, etc., f.o.b. mine	1.30 @ 1.65
Somersets, f.o.b. mine	1.30 @ 1.55
Somersets, f.o.b. Philadelphia	2.55 @ 2.75
Pocahontas, New River, f.o.b. Hampton Roads	2.80 @ 3.00
Pocahontas, New River, on cars, Boston	3.95 @ 4.10
Pocahontas, New River, on cars Providence	3.90 @ 4.10
Anthracite stove, f.o.b. New York	5.10 @ 6.25
Anthracite egg, f.o.b. New York	5.20 @ 5.75

New York

Anthracite—With the gradual opening up of the winter demand the hard-coal shortage has now become an estabiished reality. Prices continue to rule high and many individual operators are readily obtaining a premium of a full dollar on the prepared sizes. The larger companies, however, are of the opinion that this is unwarranted and that if the consumer would apply to his regular dealer, he would be able to obtain a fair allotment at a more reasonable figure.

The car shortage is now being felt by the hard coalers. Some roads are sending out circular letters urging shippers to promptly unload, and the Lehigh Valley Co. have put a man on the road expressly for the purpose of seeing that their agents release all cars consigned them as promptly as possible.

The large companies maintain an optimistic view of the situation and believe that they will be able to handle the shortage in such a way that there will be no serious results. They are carefully proportioning all allotments and closely investigating any justifiable complaints of inadequate shipments.

We continue last week's quotations as follows:

	Upper Ports	Lower Ports
Broken	$5.00	$4.50 @ 5.00
Egg	5.25	5.20 @ 5.90
Stove	5.25	5.20 @ 6.00
Nut	5.50	5.20 @ 6.00
Pea	3.50	3.35 @ 3.60
Buckwheat	2.75	2.25 @ 2.50
Rice	2.25	1.95 @ 2.05
Barley	1.75	1.60 @ 1.70

Bituminous—The operating companies at this point claim that the soft-coal market has never been so bare of supplies for a long time, as at present. The demand has become insistent for the better grades, which are almost entirely out of the market. The selling agencies claim that their troubles now are confined entirely to obtaining sufficient coal to meet their obligations.

The shortage is being further aggravated by an inadequate car supply and an insufficiency of labor at the mines. The movement on the roads continues good, but the lack of sufficient equipment for loading, interferes seriously with the output. Stocks at tidewater are said to be lower than ever before.

We quote prices further advanced as follows:

West Virginia, steam	$2.50@2.60
Ordinary grades Pennsylvania	2.60
Fair grades, Pennsylvania	2.65@2.75
Good grades, Pennsylvania	2.90@3.00
Best Miller, Pennsylvania	3 05@3.15
Georges Creek	3.30

Pittsburgh, Penn.

Bituminous—Demand continues to increase steadily from manufacturers and retail dealers. While the latter are well covered by contracts, there is considerable buying of small lots by manufacturers, and prices are much steadier than they were two or three weeks ago. Every effort is being made to increase shipments in the Lake trade, but the dispatch is not good at Lake ports and the car shortage is somewhat more pronounced. The pressure upon the Pittsburgh district has been very materially increased by the labor troubles in West Virginia.

We repeat former quotations, which are now being quite well maintained, except perhaps upon the most desirable business: Mine-run and nut, $1.05@1.10; ¾-in., $1.25; 1¼-in., $1.35; slack, 60@70c. per ton at mine, Pittsburgh district.

Connellsville Coke—The market has stiffened very materially. Sales have averaged no heavier, but supplies have been restricted and production is perhaps less than it was two or three weeks ago. In the past six weeks the market has been supported in various ways. First there was the buying of furnaces which held off while the demand for $2.50 was maintained by a more or less general understanding. Then there was fairly large buying by furnaces which had long-time contracts, but evidently desired to accumulate a surplus, while in the past week or ten days there has been buying by furnaces whose supplies are wholly or partly cut off by the troubles in West Virginia. Not only have West Virginia coke shipments been reduced; shipments of coal to byproduct plants in the west have also been curtailed, and this has thrown the demand to Connellsville.

In the past week 5000 to 7000 tons of prompt furnace coke has sold at $2.30 and $2.35, while a contract was closed for 5000 tons a month over the fourth quarter at $2.40. We quote: Prompt furnace, $2.30@2.35; contract furnace, $2.35@2.50; prompt foundry, $2.40@2.50; contract foundry, $2.40@2.75.

The *Courier* reports production in the Connellsville and lower Connellsville region in the week ending Sept. 7 at 357,839 tons, a decrease of 14,000 tons, and shipments at 3778 cars to Pittsburgh, 5903 cars to points west and 930 cars to points east, a total of 10,611 cars, a decrease of 421 cars.

Philadelphia, Penn.

Dealers are finding that it is easier to sell coal than to obtain it, orders hanging on for four or five weeks, and then scant advices being received as to when shipments will be made. Chestnut, which was in better supply than any of the other sizes, has again run short, due to the heavy demand for it as a substitute for stove.

Reports from all districts reached through this port, are to the effect that the fall demand has started up, and numerous inquiries are being made. One dollar per ton is being offered over and above the f.o.b. price at Philadelphia, and little or no coal offered at that; this refers to egg and stove. There has been no indication that the large companies are disposed to increase the prices in any way, but the individuals are taking advantage of the situation. The trouble is not to dispose of the output, but to equitably distribute that produced, and as one large operator put it, this is but the beginning. Strenuous times may be looked forward to this winter.

Bituminous trade is looking better every day. There is a still more active inquiry, and prices have taken a jump of anywhere from 15 to 35c. over figures quoted a couple of months ago. There is a comfortable season ahead for both the anthracite and bituminous industries, as far as disposing of the output is concerned.

Buffalo, N. Y.

As a rule the salesmen who come in from Pittsburgh say that they have orders to mark everything higher. Practically nobody here will take orders at former prices and they will not sell, even at the new advance, for shipments any length of time ahead. All conditions of business generally point in the same direction.

There is a fast growing demand and several elements tending to hold back the production. Men are scarce and other industries are not letting them go into the mines. The car situation is growing tenser right along, though the roads are doing well and keeping off an actual famine as long as they can. The big grain movement is not begun yet, though it will in a very short time, after which there will be any amount of delay from the car shortage. The State Public Service Commission is sending out special directions to the roads not to allow perishable freight to suffer from delay, and are sending men to enforce the orders. There is no dissenting voice from this view of the outlook.

For the present, bituminous quotations will be $2.60 for three-quarter, $2.50 for mine-run and $2.10 for slack from the Pittsburgh district, with about 25c. less for Allegheny Valley. Pittsburgh and Panhandle slack, which were quite low a while ago, have now about returned to a level with sizes, Allegheny Valley being unusually strong. The demand for coke is urgent, and with production light, prices ought to advance soon. At present it sells on a basis of $4.50 for best Connellsville foundry.

The anthracite situation grows more strenuous if anything. Many dealers are coming here begging for any amounts. Independent coal is from 40c. to $1 or more than standard prices, with dealers unable to meet the demand or even approach it. Lake shipments for the week were 142,000 tons, above the average, but even this was unsatisfactory.

Baltimore, Md.

The demand during the past week was much greater than the supply, due to the fact that sufficient equipment could not be obtained from the railroads.

Consumers, both great and small, have awakened to the fact that the lack of cars is going to be a vital factor in the coal trade this fall, and there seems to be a rush to procure fuel for stocking-up purposes. Had the railroads been able to furnish sufficient equipment, there is no doubt but that the movement during the past week would have been greater than during the active demand last spring, when there was a possibility of a general strike.

Prices for all grades held firm through the week, and the trade believes that the present high level will be maintained for some time to come; the demand for slack and the low grades has been exceptionally heavy. The coke trade is still showing activity, and inquiries are increasing.

Columbus, Ohio

The car supply is the dominating feature of the coal trade in all parts of Ohio. The supply is growing scarcer as the winter approaches, and there is not much hope of improvement in the situation; it is believed things will become worse instead of better and that prices will again be advanced about Oct. 1.

The recent circular is being well maintained. Outside of a few isolated cases there are no complaints of price cutting and practically every one is getting the full quotation. Orders for all grades are coming in fast and operators and jobbers have all the business they can take care of. Both domestic and steam orders are accompanied with a request for immediate shipment if possible.

The domestic trade is the strongest point in the market. Retailers are receiving a large amount of business and they are placing heavy orders with the

operators and jobbers. There is considerable storing of all domestic grades, including Hocking lump, which is not generally used in this way.

The steam trade is running along steadily with an increase in the amount of coal consumed by many of the larger manufacturing establishments. Railroads are taking a larger amount of fuel, which helps to strengthen the steam trade. Prices on both mine-run and the small sizes are ruling firm in every section.

Lake coal is still moving to the Northwest, but the car shortage is affecting shipments to a certain extent. The Northwest is still clamoring for coal and the congestion on the docks of the upper lake ports is being relieved to a certain extent by a better movement to the interior. Dock prices have not yet advanced, but remain quite firm.

The car shortage has affected the output in the various districts. In the Hocking Valley the production was curtailed to about 35 per cent. of normal and in eastern Ohio the output was only about 60 per cent. of the average.

Quotations in the Ohio fields are:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.65		$1.65	$1.65
2-in.	1.45	$1.20	1.50	1.45
Nut	1.15		1.50	
Mine-run	1.20	1.05	1.25	1.20
Nut, pea and slack	0.55		0.60	0.50
Coarse slack	0.45	0.60	0.50	0.40

Hampton Roads, Va.

Probably the most noteworthy feature at Hampton Roads during the past week was the advance of the circular price at this port from $2.70 to $2.80. The continued heavy demand, with a limited amount of coal moving, could result no other way. Many shippers are already finding it difficult to supply their regular trade, and are, therefore, unable to take advantage of some attractive spot business thrown upon the market. There is no evading the fact that there is now a shortage of coal here.

It is encouraging to note, however, the dispatch with which the tidewater railroads are moving the product from the mines, thus aiding shippers materially in handling the heavy charters. The car supply, too, has been reassuringly good, which may possibly be traced, on the C. & O. Ry., to the decreased need on that line in the Kanawha district, where nine-tenths of the mines are idle because of the strike, thus permitting these cars to move into the New River belt. A good season appears to be in store for Hampton Roads shippers.

Birmingham, Ala.

There is further improvement in the coal trade in Alabama, and while prices have not advanced, the market is considered firmer than it has been for some time and there is need for a larger output. The car shortage, which has been felt during the past four weeks, is to be relieved by a supply of gondolas and hopper-bottom cars. Consumers who objected to receiving coal in this class of equipment are now expressing a willingness to accept it in any kind of cars.

The estimate that nine million tons of coal were mined during the first six months of the year is being reiterated for the second half, which means an output of at least 18,000,000 tons for the year 1912, the greatest production ever obtained. The production during the balance of the year will be heavy, as the railroads are making every effort to furnish cars.

Memphis, Tenn.

The market for Memphis and adjoining territory has considerably improved in the last ten days to two weeks. The cotton gins have begun to take coal, laying in a supply for their future needs, when they begin operations, which will be within the next ten days.

The prospect is somewhat better for a good coal business throughout the cotton-raising belt. The crops have gained such headway for the latter part of the season that farmers have every reason to expect a large yield.

The scarcity of cars on the I. C. R.R. for the last few weeks has stiffened up prices on all grades, both in Illinois and Kentucky.

Prices are ruling about as follows:

Kentucky			
Mine-run	$0.90	@	$1.10
Screened lump	1.35	@	1.50
Nut	1.10	@	1.30
Screens	0.40	@	0.50
Illinois			
Mine-run	$1.15	@	$1.25
Block and lump	1.40	@	1.75
No. 1 Nut	1.75		
Screenings	0.70	@	0.85
Alabama Coal			
Carbon Hill mine-run	$1.15	@	$1.25
No. 1 lump	2.00	@	2.25
Domestic nut	1.40	@	1.55
Cahaba	2.70	@	3.00

The Cahaba field at this time of the year is always sold up beyond capacity, which makes the Block coal bring a price of $2.70@3 regardless of the weather or car-supply condition.

Knoxville, Tenn.

There has not been such a long continued warm season in this district in sixteen years, and still continues unbroken. In spite of this condition, operators in the Kentucky-Tennessee field report a constant improvement in the demand for domestic and steam, especially the former.

The political outlook is regarded favorably here, and this has had an excellent effect upon the coal markets. Another feature that is toning up general conditions is the recent increase in the capital stock of the L. & N. R.R., which serves the western Kentucky, Kentucky-Tennessee and Alabama coal fields. Other lines are also expending large sums.

Large fuel contracts placed by the Southern Ry. in the Middlesboro field, and the 200,000-tons contract placed with a Knoxville company, by the Seaboard line, have helped strengthen prices in this field.

Detroit, Mich.

Owing to the fact that a pretty fair supply of bituminous coal is coming in, the prices on these grades have not advanced as rapidly as one might expect in the face of an anthracite famine. There is no difficulty, however, in disposing of any amount of soft coal on track, but the prices are no greater than ordinarily at this time.

Very few operators are closing contracts for soft coal, as most of them prefer to chance the open market this fall, hoping for a big advance in price. The famine scare has aroused some of the larger consumers to action a little earlier this year than usual. Factories who used to wait until winter arrived and then pick up spot coal have, during the summer, enlarged their storage capacity, and are now buying in large quantities. Slack is getting scarce, and is not coming in as rapidly or in such quantities as it did earlier in the summer. This grade is now being quoted at 85c.

This week's prevailing prices are as follows, f.o.b. mines:

	W.Va. Gas	Pocahontas	Pittsburgh	Hocking
Domestic lump	$1.20	$1.60		$1.65
Lump and egg				
¾ lump		1.25	$1.30	1.40
Washed nut				
Washed pea				
Mine-run	1.10	1.15	1.10	1.20
Slack	0.85	0.85		

Chicago

The Chicago market is quite stiff at the present time, and that there will be sharp advances in prices is freely predicted. Heavy steam users are sending in orders freely. There is a possibility that there will be as high as a 50 per cent. shortage in anthracite, considering the rapidity with which that reaching the Chicago docks is being snapped up. There is a large demand for every pound of coal arriving and the chance for a future reserve supply is very slim.

The byproduct, egg, stove and nut, and gas-house cokes, remain at the same figure prevailing last week, $4.75 to $4.85. Orders for smokeless are coming in so rapidly as to cause sales managers much anxiety. Requisitions for gondolas are being refused, and the scarcity of hoppers is soon due.

Prevailing prices at Chicago are:

	Sullivan Co.	Springfield	Clinton
4-in. lump	$2.37@2.47		
Domestic lump		$2.32	$2.27
Egg	2.37@2.47		
Steam lump		1.97	2.12
Mine run	1.99½	1.87@1.97	1.92
Screenings	1.47@1.52	1.27@1.32	1.27@1.32

Coke—Prices asked for coke are: Con-

nellsville, $5@5.10; Wise County, $4.85 @5; byproduct, egg and stove, $4.75@ 4.85; byproduct, nut, $4.75@4.85; gas house, $4.75@4.85.

St. Louis, Mo.

The St. Louis market has been steadily going up, especially on the high-grade coals. The Standard market is still dragging along in the "below cost of production" column. There has been a shortage of Carterville coal, and some of the operators are sold up for four weeks ahead. These operators are asking as high as $2 a ton for lump and egg, in order to ward off inquiries.

Everything, however, points to better prices, both on Standard and high-grade coals. It is simply impossible to get anthracite in this market, and such as is coming in is bringing a premium of from 10 to 20c. a ton.

The prevailing prices are:

Franklin County	
Lump and egg	$1.75@2.00
No. 1 nut	1.50@1.60
No. 2 nut	1.40@1.50
Screenings	0.50@0.60
Carterville	
Lump and egg	$1.75@2.00
No. 1 nut	1.15@1.25
Screenings	0.50@0.60
Mine-run	1.10@1.20
No. 1 washed	1.60@1.75
No. 2 washed	1.30@1.40
No. 3 washed	1.10@1.20
No. 4 washed	0.80@0.90
No. 5 washed	0.50@0.60
Big Muddy	
Lump and egg	$2.10

All the above coals take a 67c freight rate to St. Louis, with the exception of Big Muddy, which takes a 64½c rate.

Mount Olive	
6-in. lump	$1.35
2-in. lump	1.25
Screenings	0.50@0.55
Standard	
6-in. lump	$1.10@1.20
2-in. lump	0.95@1.05
Screenings	0.35@0.45
Mine-run	0.90@0.95
Trenton	
Lump and egg	$2.00

The above coals take a 52c. rate to St. Louis.

There is a good tonnage of smokeless moving in, which indicates that it is not as scarce as it has been, and the same applies to gas-house and byproduct coke; the latter is, in many cases, displacing anthracite coal.

Minneapolis—St. Paul

With the cool fall weather of the past week, retailers in the Twin Cities have been quite busy. Consumers have become aware of the fact that there really is a hard-coal shortage and when a car arrives at the dealers' yards it is unloaded in record-breaking time.

The shortage has become alarming at the head of the Lakes, and a number of the shipping companies are not accepting orders for hard coal. Some of the docks are entirely out of all grades of anthracite, while others have some of one size and none of another, but every dock is practically out of stove coal. Some companies will accept orders on anthracite if accompanied with a like quantity of the bituminous grades.

The car situation at the docks would be acutely felt if it was not for the fact that there is little coal to handle. Effective Sept. 12, Pocahontas on the docks advanced 50c. per ton. Prices on other coals are the same as the circular issued the first of the month. Illinois coal is selling at only a fair price. One Illinois company advises that their mines are only working a little over half time on account of inability to secure cars.

Portland, Ore.

The market presents no new features here, at this time. Prices remain stationary and there seems to be no indication of an early change. No vessels have yet been booked for arrival here this fall and winter with coal from Australia. The car shortage has not yet been felt seriously, but shippers are anticipating more or less trouble when the crops begin to move in volume. So far the crop movements have been rather light, although the yields are heavy; this is due to the fact that the weather has delayed harvesting.

Production and Transportation Statistics

Norfolk & Western Ry.

The following is a comparative statement of the coal and coke shipments over the lines of the N. & W. Ry. for the month of July, 1911-12, and the first seven months of the current year, in short tons:

Destination	July 1911	July 1912	Seven Months
Coal			
Tidewater, foreign.	67,738	116,339	950,893
Tidewater, coastwise	272,699	305,515	2,119,813
Domestic	1,350,835	1,577,396	9,994,907
Coke			
Tidewater, foreign.	5,465	9,197	50,101
Domestic	79,646	88,030	789,338
Total	1,776,383	2,096,477	13,905,052

Virginian Railway

Total shipments of coal over this road for July of the current year were 245,087 net tons as compared with 256,070 for the month previous.

Foreign Markets

Oriental Markets

Japan, Aug. 8, 1912.—Only a very small business has been done on this market as freights are still high whilst exchange has collapsed entirely owing to the stoppage of the loan negotiations with China. Stocks on the spot are up to the average and prices are steady at quotations; in Japan, however, prices are a little weak although stocks at shipping ports are decreasing.

Manchuria.—A certain amount of business has been done, principally for delivery to river ports and tonnage is wanted for same whilst there is also some demand from Hongkong. The mines are now working at their normal output which averages about 4000 tons a day.

Kailan Coal.—Here we have a firm market, usual deliveries and high freights; stocks on the spot are up to the average. There is a small amount of enquiry forward and the market promises to remain firm; prices in the North are also very firm.

Great Britain

Sept. 6—Irregular conditions continue to prevail in the steam-coal market, owing to lack of tonnage, and the tendency is decidedly in the shippers' favor, so far as prompt loading is concerned. Sellers continue to hold for higher prices for forward loading. Prices are approximately as follow:

Best Welsh Steams	$4.08 @ 4.14
Best Seconds	3.90
Seconds	3.72
Best Dry Coals	4.08
Best Monmouthshire	3.66
Seconds	3.42
Best Cardiff Smalls	2.70
Seconds	2.52

The prices for Cardiff coals are f.o.b. Cardiff, Penarth, or Barry, while those for Monmouthshire descriptions are f.o.b. Newport, both exclusive of wharfage, and for cash in 30 days—less 2½%.

Financial Notes

Cape Breton Coal, Iron & Railway Co. (Ltd.)—Bonds of this company were offered in London at £98 per £100 bond with a $100 bonus in full paid stock. It is planned to issue £300,000 of the total authorized £410,900, 6%, first mortgage gold bonds.

Virginia Iron, Coal & Coke Co.—For the last three years this company has shown an annual deficit averaging about $234,814 per year although in 1907 it had a surplus of $600,007, and in 1908 a surplus of $117,945. In 1911 large amounts were written off for depreciation.

Paint Creek Collieries Co.—This company has mining leases on 13,285 acres of coal lands in Kanawha and Fayette Counties, W. Va., containing approximately 120,000,000 tons of high-grade mineable coal above water level in the Kanawha measures. It has 12 operating collieries, 10 of which are on lands of the Paint Creek Coal & Land Co. and two on lands of Olcott Coal & Iron Co. The present capacity is over 5000 tons per day, which can be rapidly increased with new machinery.

Utah Company of Maine.—It is said that the $10,000,000 notes issued by this company will provide sufficient funds to pay for about two-thirds of the cost of the properties acquired by it. It has been suggested that instead of selling another $5,000,000 worth of notes, the directors could, in view of the demonstrated earning capacity of the company, advance the dividend rate on the common from 4 per cent. to 6 per cent. Such a move would practically insure the success of the sale of 100,000 shares of common at par, giving the additional $5,000,000 cash required to complete the transaction.

Pittsburgh Coal Co.—It is said this company plans to pay off the back dividends and retire the preferred by an issue of 5% debenture bonds. This would necessitate an increase in the bonded indebtedness of $42,500,000, which on the basis of 5% would increase the annual charges $2,125,000. Bonded debt to the first of the current year consisted of $10,084,000, 5% first mortgage bonds, and $5,926,120, 5% debenture bonds, making a total of $16,000,000. Interest on these amounts to $800,000 a year, which, together with that on the proposed new bond issue, would bring the annual charges up to $2,925,000.